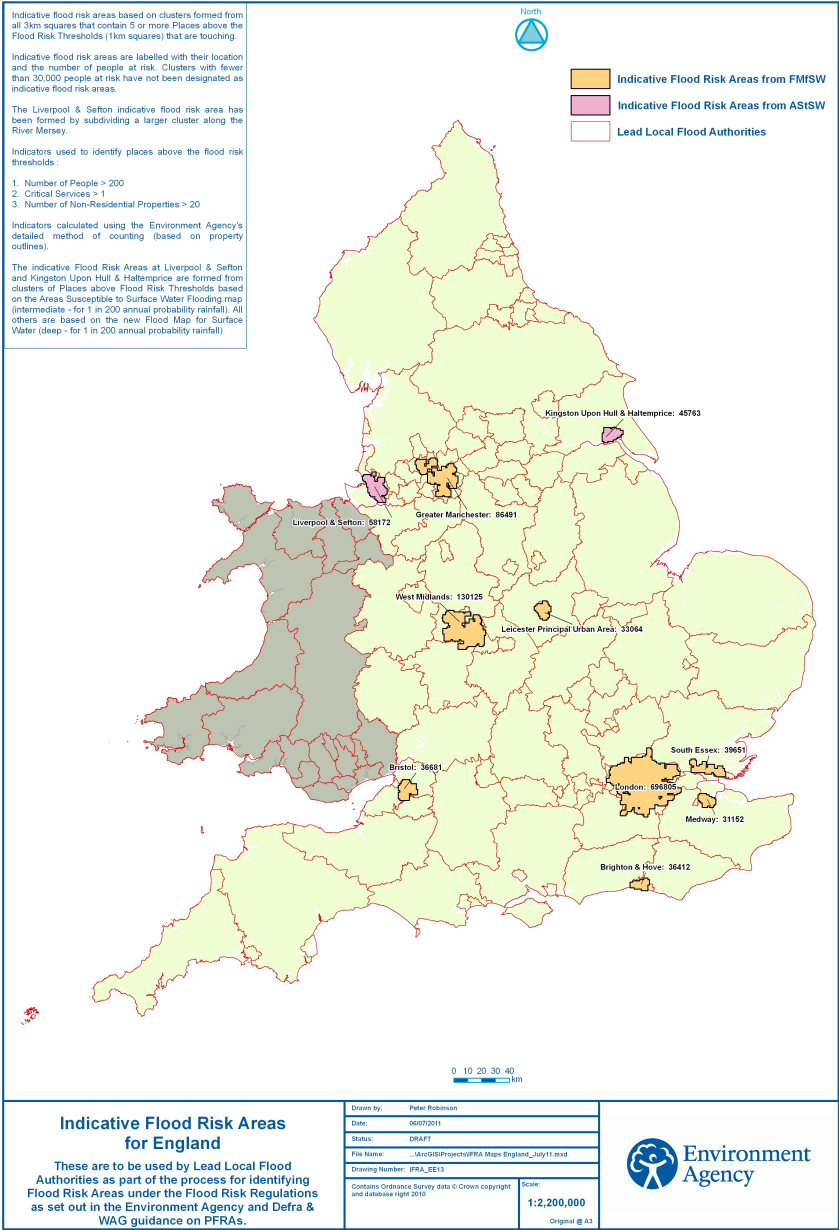


Understanding the risks, empowering communities, building resilience: the national flood and coastal erosion risk management strategy for England

Session: 2010-2012
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CORRECTION

Correction required for the map on page 8, figure 3 - Main urban areas at risk of surface water flooding in England. Names of five of the indicative Flood Risk Areas have been amended to more accurately reflect the geographical areas at risk (Kingston Upon Hull and Haltemprice, South Essex, Medway, Liverpool & Sefton and Leicester Principal Urban Area).



Correction required, to properly recognise the sources of funding for land drainage works carried out by Internal Drainage Boards (IDBs), on page 32, 4th paragraph, on the 4th line.

A correction from:

IDBs are the land drainage authority within their districts and their functions include the supervision of land drainage, funded by landowners, and flood defence works on ordinary watercourses or other flood sources as requested by local authorities or the Environment Agency."

To: IDBs are the land drainage authority within their districts and their functions include the supervision of land drainage, mainly funded by landowners and local authorities, and flood defence works on ordinary watercourses or other flood sources as requested by local authorities or the Environment Agency.

Understanding the risks, empowering communities, building resilience

The national flood and coastal erosion
risk management strategy for England

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building resilience**

**The national flood and coastal erosion risk
management strategy for England**

**Presented to Parliament pursuant
to Section 7 of the
Flood and Water Management Act 2010**

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Foreword

Flooding and coastal erosion can have a devastating impact on communities. I saw this first-hand in my constituency during the floods of 2007 and we are reminded whenever events unfold, most recently in Cumbria in 2009 and Cornwall last winter. I have also seen for myself the destructive power of the sea in areas like North Norfolk and Lincolnshire, as treasured land and property along the coast is lost to erosion. Whilst we cannot fully tame the forces of nature we can better understand the risks we face and make ourselves more resilient as a society.

The Pitt Review identified many lessons from the 2007 floods, and this national strategy, the first of its kind for England, marks an important milestone in taking forward Sir Michael's report. Much has been achieved since 2007, with the Flood and Water Management Act, greater powers and clarified responsibilities for tackling local sources of flood risk, and a new role for lead local flood authorities in bringing partners together and making sure things get done. We have a National Flood Forecasting Centre, an enlarged and better trained national flood rescue capability, and we recently tested our new emergency response arrangements during the largest civil contingency exercise ever, Exercise Watermark. As a result of investment by all risk management authorities 180,000 households are now better protected than they were in 2008. But there is much more that can be done.

This strategy provides the overarching framework for future action by all risk management authorities to tackle flooding and coastal erosion in England. It has been prepared by the Environment Agency with input from Defra, to ensure it reflects Government policy. Localism is at the heart of the new strategy, recognising that there is a limit to what Government and national bodies can achieve alone, and that national priorities are only part of the picture. An important role for Government remains, not least in channelling substantial investment from the national taxpayer to help pay for risk management activity around the country. We also need to make sure that consistent approaches are taken within each river catchment and coastal area. Issues need to be managed at the appropriate spatial scale, and we mustn't simply move problems from one area to another.

We cannot escape the fact that the way we manage flooding and coastal erosion risk has an enormous impact on the environment for better or worse. I am determined that we should improve the environment through managing flood and coastal erosion risk as well as avoiding or off-setting damage to protected habitats, which we are required to do by international obligations. This is not a question of prioritising birds over people, but working to protect people and the natural environment. The costs of doing this are relatively small but make a big difference in ensuring that we have a legacy of healthy ecosystems to sustain our well-being and, in many cases, important local economies.

But if there is one thing we need to achieve in the coming years, it is to re-engage our communities in the risks they face and the choices that affect them. Our communities deserve greater licence to inform and indeed influence long-term approaches. We need to allow more flexibility to reflect local circumstances, and remove unnecessary barriers that may be preventing simple and sensible things being done. Work is underway to reflect on the lessons of the recent Coastal Pathfinders, so that we can better support our communities on the front line of coastal erosion.

Allied to this, we mustn't let local ambitions for protection and our investment plans be constrained by national budgets. Instead we will reform the way in which national funding is allocated to projects, to allow and encourage other sources of funding to come forward and supplement Government funding. In doing so, we move investment plans onto a more sustainable footing, and create the opportunity for as many communities as possible to enjoy the benefits that flood and coastal defences bring. The reforms aim to create a level playing field between all sources of flood risk, and coastal erosion, for the purposes of national

funding. Within this nationally consistent, benefit-led framework, local choices can be made about the balance between protecting inland and coastal areas, and between urban and rural areas. Choices can also be made locally about where the balance of funding comes from, or how to find savings, if national budgets cannot meet the full costs of every local priority.

I am delighted to lay this national strategy for flood and coastal erosion risk management before Parliament, which I believe is much improved following the period of full public consultation. It represents an important step forward but is by no means the end of the story. Local risk management strategies, being prepared across the country, will make this national framework locally relevant and inform delivery plans in each area. This strategy also sits within an evolving policy context, with the emerging national planning policy framework and the forthcoming Natural Environment White Paper just two new aspects of the policy landscape that risk management authorities will need to operate within.

In my time as Minister I have seen what can be achieved when communities and local partners work together to solve the problems they face. I have seen apparently insurmountable problems overcome by partners working together with a common purpose, pooling their energy and resources. I am therefore confident that by working together, within the common framework that this strategy provides, that as a society we can rise to the challenge of our changing climate and tackle the risks we face.

Richard Benyon.



Richard Benyon MP, Parliamentary Under-Secretary of State

Executive summary

Flood and coastal erosion risk in England is expected to increase due to climate change and development in areas at risk. It is not possible to prevent all flooding or coastal erosion, but there are actions that can be taken to manage these risks and reduce the impacts on communities.

This strategy builds on existing approaches to flood and coastal risk management and promotes the use of a wide range of measures to manage risk. Risk should be managed in a co-ordinated way within catchments and along the coast and balance the needs of communities, the economy and the environment. This strategy will form the framework within which communities have a greater role in local risk management decisions and sets out the Environment Agency's strategic overview role in flood and coastal erosion risk management (FCERM). This approach is aligned with the recommendations made by Sir Michael Pitt in his review of the summer 2007 floods.

The strategy encourages more effective risk management by enabling people, communities, business, infrastructure operators and the public sector to work together to:

- ensure a clear understanding of the risks of flooding and coastal erosion, nationally and locally, so that investment in risk management can be prioritised more effectively;
- set out clear and consistent plans for risk management so that communities and businesses can make informed decisions about the management of the remaining risk;
- manage flood and coastal erosion risks in an appropriate way, taking account of the needs of communities and the environment;
- ensure that emergency plans and responses to flood incidents are effective and that communities are able to respond effectively to flood forecasts, warnings and advice;
- help communities to recover more quickly and effectively after incidents.

The strategy shows how communities can be more involved in local flood and coastal erosion risk management. It also emphasises the need to balance national and local activities and funding.

In setting out future approaches to FCERM, this strategy considers the level of risk and how it might change in the future, the risk management measures that may be used, roles and responsibilities, future funding and the need for supporting information.

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1 Introduction

The risk of flooding and coastal erosion in England is predicted to increase due to climate change and development in areas at risk. It is not possible to prevent all flooding or coastal erosion, but there are actions that can be taken to manage these risks and reduce the impacts on communities. This flood and coastal erosion risk management (FCERM) strategy for England builds on existing approaches to managing risk. It aims to encourage the use of all of the available measures in a co-ordinated way that balances the needs of communities, the economy and the environment.

This strategy sets out a national framework for managing the risk of flooding and coastal erosion. It will help risk management authorities and communities understand their different roles and responsibilities and will be particularly relevant to Lead Local Flood Authorities (LLFAs) which have new responsibilities under the Flood and Water Management Act (2010)⁽¹⁾. It addresses all forms of flooding and coastal erosion consistent with the definitions in the Act.

To do this it considers:

- how the current risk of flooding and coastal erosion may change;
- the measures that can be used to manage these risks;
- the functions of those involved in flood and coastal erosion risk management and how these organisations can work together better;
- how work will be paid for and the costs and benefits of the measures used;
- the guidance and advice available to help manage flood risk and coastal erosion.

This strategy aims to make sure that Defra, the Environment Agency, local authorities, water companies, internal drainage boards and other FCERM partners work together to:

- maintain and over time improve standards of protection against flood and coastal erosion risks where it is affordable to do so;
- increase the overall level of investment in flood and coastal erosion risk management to supplement central government expenditure;
- help householders, businesses and communities better understand and manage any flood and coastal erosion risks that they face;
- ensure fast and effective responses to and recovery from flood events when they do occur;
- give priority to investment in actions that benefit those communities which face greatest risk and are least able to afford to help themselves;
- encourage and support local innovation and decision making within the framework of river catchments and coastal cells;
- achieve environmental gains alongside economic and social gains, consistent with the principles of sustainable development.

The strategy also aims to clarify the responsibilities and roles of all the organisations involved in flood and coastal erosion risk management.

1.1 What is flood and coastal erosion risk management?

Managing flood risk and coastal erosion involves:

- knowing when and where flooding and coastal erosion are likely to happen;
- taking reasonable steps to reduce the likelihood of them happening;
- forecasting and providing warnings of floods so that people, businesses, infrastructure providers and public services can take effective action to minimise the consequences of floods, and
- adapting to coastal change and acting to reduce the risk to life, damage and disruption caused by flooding.

Examples of the assets that may reduce the likelihood of floods or coastal erosion include: maintained river channels; raised embankments; floodwalls and seawalls; culverts and sustainable drainage systems (SuDS). Normally a number of assets will be used together to manage the risk in a particular area, working in combination within a risk management system.

Examples of the steps that may be taken to reduce the damage and disruption when floods or coastal erosion do happen include: controlling inappropriate development to avoid increasing risk; adapting buildings to minimise damage; moving items such as household goods, treasured possessions or vehicles away from floodwater; and making sure that a proper emergency response plan is in place and can be operated when needed as set out in the National Flood Emergency Framework.

Other steps that may be taken to manage risk include:

- transferring risk to other areas where the consequences are low, for example by allowing land to flood and contain floodwater to prevent flooding elsewhere; or by sharing part of the risk with others with their agreement, for example by sharing the cost of flood damage through insurance;
- tolerating a residual level of risk, for example by accepting that a flood may cause some disruption that is prepared for or is dealt with when it occurs.

1.2 Why has a strategy been produced?

The Flood and Water Management Act (the Act) states that the Environment Agency must '*develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England*' as part of its strategic overview role for flood and coastal erosion risk management. In response to this, the Environment Agency has developed this strategy jointly with the Department for the Environment, Food and Rural Affairs (Defra) to ensure that it reflects government policy.

The Act addressed many of the issues identified following the floods in the summer of 2007 and the subsequent review by Sir Michael Pitt⁽²⁾ as well as earlier studies such as the Foresight *Future Flooding* report⁽³⁾, the Institution of Civil Engineers (ICE) Ministerial Commission's *Learning to live with rivers*⁽⁴⁾, and government's *Making space for water*⁽⁵⁾. Previous legislation was limited to giving authorities narrow powers to drain

land, build defences and provide flood warning without providing for wider approaches to managing risks. In response to the development of thinking on flood risk management, the Act gives county and unitary local authorities a local leadership role and the Environment Agency a national overview role in relation to FCERM. This strategy will be central to the implementation of the Act, and will provide a framework for managing all sources of flood and coastal erosion risk in a co-ordinated way.

1.3 Who is the strategy aimed at?

This strategy is aimed at the main flood and coastal risk management authorities identified in the Act and other organisations with FCERM roles as shown in Figure One. The main functions of these organisations are summarised below and set out in detail in Chapter 4:

- the Government sets out FCERM policy, led by the Department for the Environment Food and Rural Affairs (Defra). Other policy areas that are relevant to FCERM include planning policy and building regulations (Department for Communities and Local Government) and civil contingencies (Cabinet Office);
- Environment Agency functions include the strategic overview role for all sources of flooding and coastal erosion, the delivery of flood and coastal erosion risk management activities on main rivers and the coast and the regulation of reservoir safety. It also works in partnership with the Met Office to provide flood forecasts and warnings through the national Flood Forecasting Centre;
- lead local flood authority functions include the development of local flood risk management strategies showing the extent of flood risk in the area and how it will be managed in partnership with others. In particular the local strategies will identify risks and include actions to alleviate flooding from surface water, groundwater and ordinary watercourses;
- coastal erosion risk management authority functions include planning shoreline management activities with input from the Environment Agency and the delivery of coastal erosion risk management activities;
- district councils, internal drainage boards and riparian land owners/managers have a function in managing the risks of flooding from ordinary watercourses (for example streams and drainage channels);
- water companies, reservoir owners, highways authorities and other organisations have a FCERM function in managing their own assets or structures where the structure forms part of an FCERM system and to reduce the risk of flooding from their activities.

Regional Flood and Coastal Committees (RFCCs) have a key role in the co-ordination of FCERM by advising on and approving the implementation of programmes of work for their areas, and supporting the development of funding for local priority projects and works. RFCCs also provide for local democratic input through the majority membership of representatives from Lead Local Flood Authorities.

This document will also be of interest to the equivalent FCERM organisations in Wales and Scotland, including the Welsh Assembly Government and the Scottish Government, particularly where co-ordinated risk management across national borders is needed.

The strategy will also be of interest to:

- organisations that manage land, property, cultural heritage and the natural environment in England such as landowners, farmers, Natural England, Crown Estates, navigation authorities and the Forestry Commission;
- important service and infrastructure providers such as water companies and other utility companies, highways authorities and Network Rail;
- non-government organisations such as the Royal Society for the Protection of Birds, Country Land and Business Association, National Farmers Union, the National Trust, Wildlife and Rivers Trusts, National Flood Forum, Association of British Insurers, and the Association of Drainage Authorities.

It will also be relevant to individuals, communities and businesses at risk of flooding and coastal erosion and the general public. A summary of this document has been produced that sets out the main aspects of the strategy for a general audience.

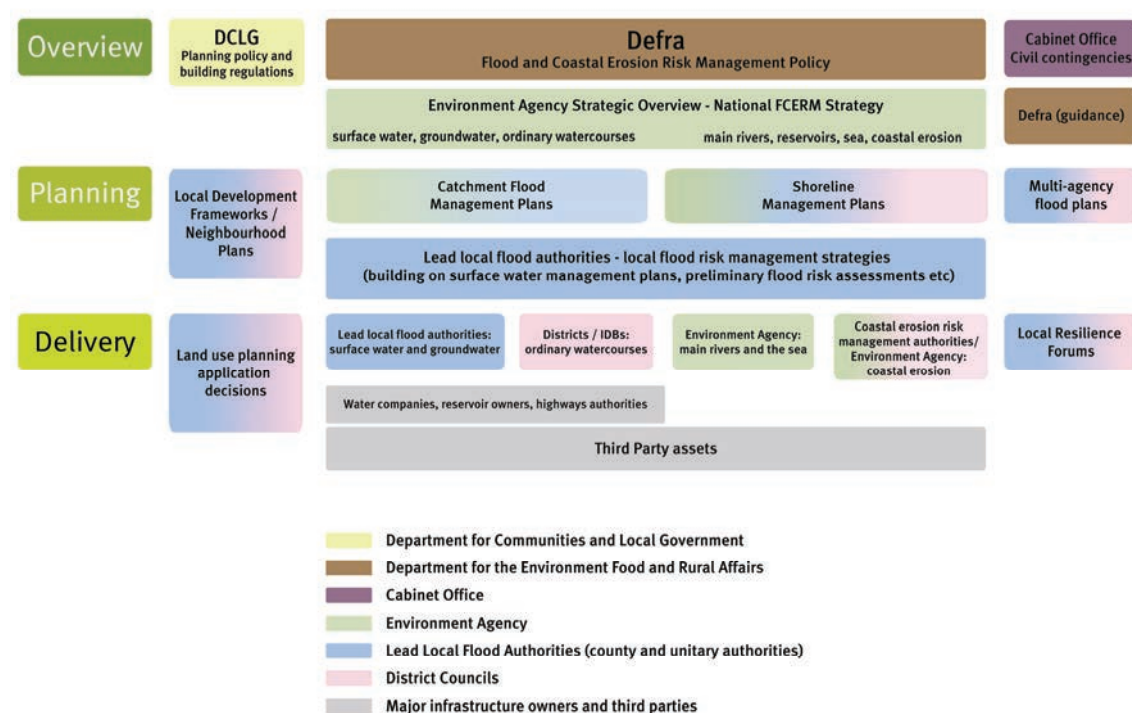


Figure One: Flood and coastal erosion risk management – overview

2 Flood and coastal erosion risk in England

In England, in 2009, around 5.2 million, or one in six, residential and commercial properties were identified as being in areas at risk of flooding from rivers, the sea and surface water. In addition, approximately 200 properties are assessed as being vulnerable at present, and 2,000 may become vulnerable, to coastal erosion over the next 20 years. Around 1.1 million properties are in areas considered to be at risk of flooding from reservoir failure.

This section sets out the scale of the problem and identifies specific areas where risk is greatest. It also shows what is being done to manage risk and what factors will affect risk both now and in the future.

2.1 Overview

Flooding and coastal erosion can have devastating impacts. The 2005 and 2009 flooding in Cumbria and the widespread flooding across England in summer 2007 resulted in loss of life and major impacts on the health and well-being of people living and working in the areas affected. The cost of the summer 2007 floods amounted to more than £3.2 billion⁽⁶⁾, with the floods in Cumbria in 2005 causing damage of £450 million. Flooding can also cause major disruption to energy, water, communications and transport infrastructure. It can interfere with public services such as schools and hospitals and have significant indirect effects through disruption to travel or loss of income. Coastal erosion and landslides on the coast affect smaller areas of land than floods but they cause permanent loss to property and infrastructure. Such losses can have significant impacts on the local economy outside the area directly affected. Flooding and coastal erosion can also have significant impacts on the environment and on cultural heritage, including causing pollution or damage to historic buildings and changes to habitats. However, for some habitats and heritage assets, managed flooding and/or deposits of material eroded from elsewhere are essential for their existence and health.

2.2 Current flood and coastal erosion risks

The following information represents a snapshot of the risks presented by flooding and coastal erosion. These data are subject to ongoing update, review and improvement, and the Environment Agency will continue to publish updated information on risks nationally.

Flooding from rivers and the sea

The *Flooding in England* report (2009)⁽⁷⁾ estimated that there are 2.4 million properties in areas that are at risk of flooding from rivers and the sea in England – equivalent to 11 per cent of the land in England. There are also significant risks to important national infrastructure, with over 55 per cent of water and sewage pumping stations/treatment works, 20 per cent of railways, 10 per cent of major roads, 14 per cent of electricity and 28 per cent of gas infrastructure located in areas at risk of flooding. Recent research has also indicated that over 50 per cent of grade one agricultural land is at risk of

flooding. However, of the 50 per cent only about 1.5 per cent has an annual probability of flooding greater than 1 in 75⁽⁸⁾ and the quality of the land may at least be partially as a result of flooding, for example because of sediment and nutrients deposited on land from floodwater. Figure Two shows the percentage area of land at significant likelihood (1:75 annual chance or greater) of flooding from rivers and the sea taking into account existing flood management structures.

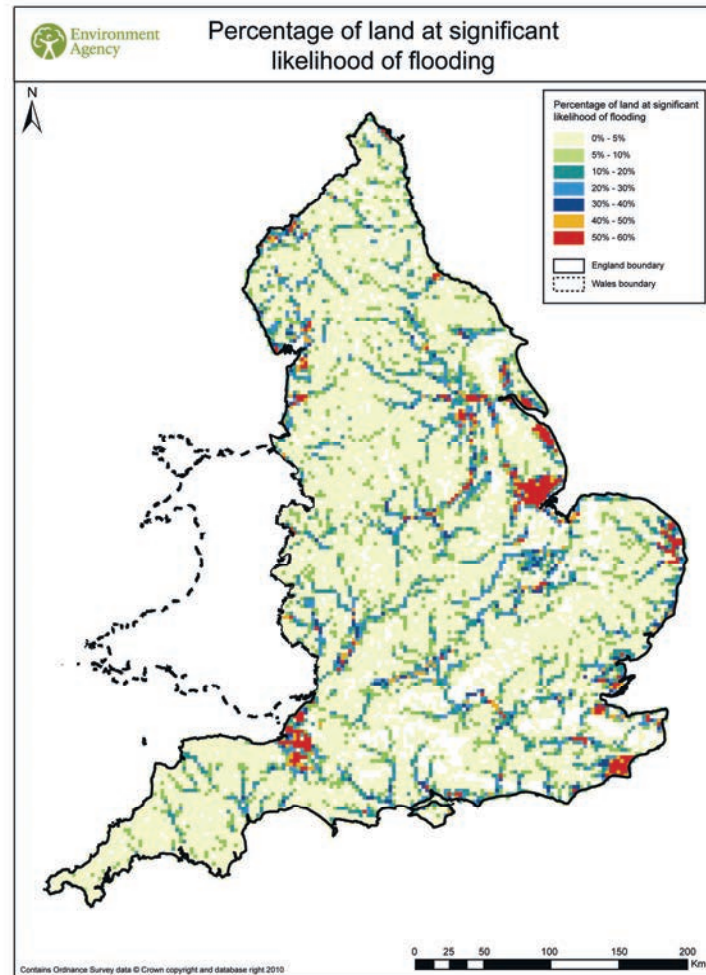


Figure Two: Percentage area of land at significant likelihood of river and sea flooding (Nafra 2010)

Floods and coastal erosion are not new phenomena and there is an extensive network of assets and systems in place to manage these risks, in particular from river and coastal flooding. As shown in Table One, the Environment Agency is responsible for approximately 70 per cent of the assets used to reduce the risk of river and coastal flooding in England with the remainder being maintained by third parties such as other risk management authorities and landowners. Coastal local authorities manage approximately 340 km of coastal erosion defences. There are also a large number of other assets that help to reduce the risk of flooding and coastal erosion in addition to their primary role, many of which are owned by third parties. These include roads, railway and other embankments, boundary and garden walls and buildings.

Table One: Extent of flood risk management systems in England

		Environment Agency		Third party	
Asset type	Total Length (km)	Length (km)	Percentage	Length (km)	Percentage
Culverts	1,860	430	23	1,430	77
Raised defence (man-made)	6,930	5,574	80	1,356	20
Sea Defence (man-made)	1,971	1,401	69	570	20
Total (km)	10,761	7,405	71	3,356	29

Flooding from surface water

Flooding in England also provided a preliminary assessment of surface water flood risk, estimating that, in total, 3.8 million properties are in areas susceptible to flooding from surface water (i.e. rainwater, including snow and other precipitation, which is on the surface of the ground and has not entered a watercourse, drainage system or public sewer). Approximately one million of these are also in areas susceptible to flooding from rivers and the sea with 2.8 million in areas susceptible to surface water flooding alone. The degree of damage that may be caused by surface water flooding will vary, for example, with flood depth, and the Environment Agency and local authorities are carrying out further work to improve the available information and understanding of these risks. Figure Three shows the main urban areas at risk of surface water flooding in England.

Flooding from groundwater

Groundwater flooding occurs where the water levels in rock and soil become high enough for the water to appear near to or above the ground surface. This may happen, for example, where there are underlying gravels, or porous or fractured rocks, allowing water to pass through. At present, understanding of this risk is limited, restricted to a broad indication of areas that may be susceptible to groundwater floods. Preliminary research in 2004 estimated that up to 1.7 million properties could be situated in areas vulnerable to groundwater emergence in England⁽⁹⁾. The 382,000 properties located on the exposed chalk aquifers in Southern England are thought to be some of the most vulnerable as groundwater levels fluctuate widely in this area. In low-lying areas of the country the management of groundwater levels and other land drainage activities can be important in managing wider flood risk. These activities are normally carried out by Internal Drainage Boards (IDBs) and currently approximately 10 per cent of the land area in England is managed in this way.

The Environment Agency is continuing to develop more understanding of groundwater flood risk on a national scale as part of its strategic overview and supporting the development of tools and approaches to understand these risks. Responsibility for managing this risk rests with local authorities.

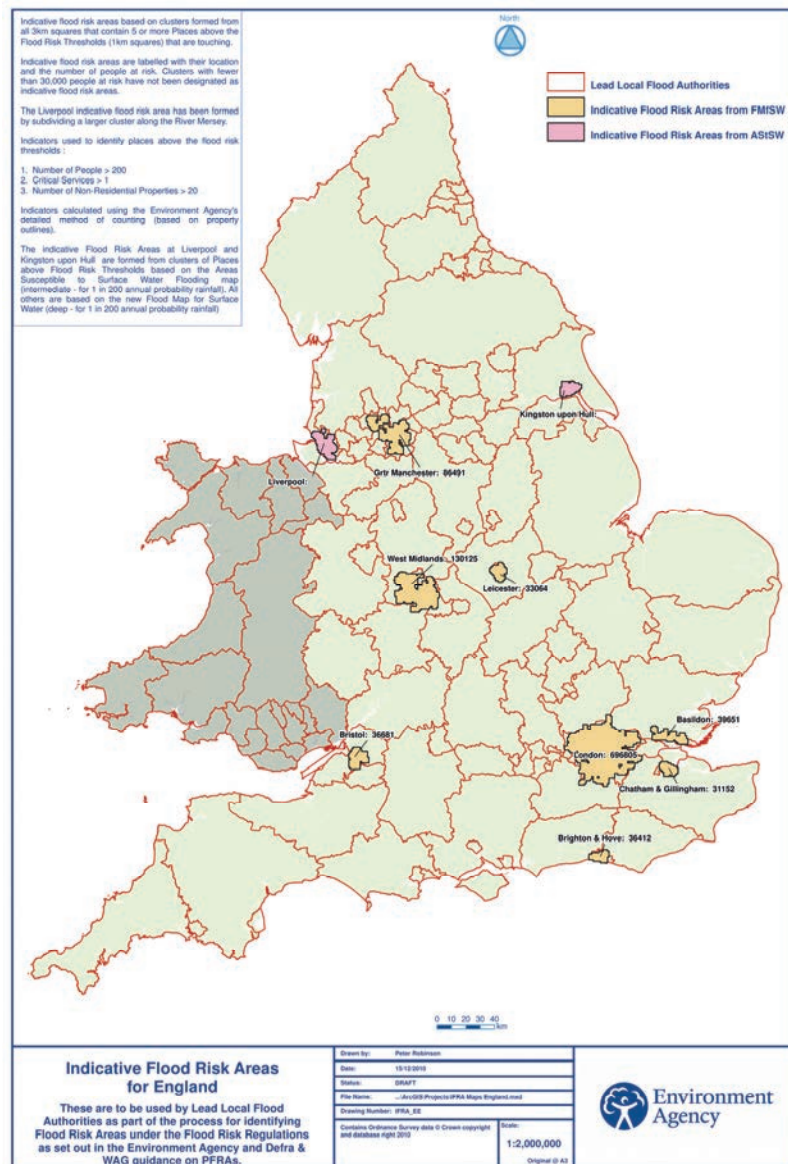


Figure Three: Main urban areas at risk of surface water flooding in England

Flooding from reservoirs

Reservoir flood mapping has shown that 1.1 million properties in England are in areas that are susceptible to flooding from the failure of large raised reservoirs. However there has been no loss of life from failure of a large raised reservoir in England since safety legislation was introduced in 1930. The risk of failure remains low but continued vigilance is needed as the average age of the large raised reservoirs is 110 years.

The Reservoirs Act (1975)⁽¹⁰⁾ was introduced to ensure that the safety of large raised reservoirs was maintained through proper engineering supervision and that a register of these structures is maintained. At the end of March 2009, there were 1,889 large raised reservoirs capable of containing over 25,000m³ of water above the natural level of the ground in England, with a further 102 either being built or modified⁽¹¹⁾. This includes 621 reservoirs where failure would put more than 10 lives at risk and cause extensive property damage.

There are also smaller reservoirs which present significant risks to people and property. The Pitt Review recognised the potential risks presented by these structures

and as a consequence changes to reservoir safety legislation were included in the Flood and Water Management Act. On commencement, these changes introduce a risk-based approach to the safety management of all high-risk reservoirs containing more than 10,000m³ of water. The Act will also reduce monitoring and regulation for low risk reservoirs above 25,000m³ capacity.

Sewer flooding

The total length of publicly owned sewers in England and Wales is some 309,000 km. The replacement cost is estimated by companies at some £180 billion (2010 prices). In total, water and sewerage companies have spent £15.3 billion of the £90 billion capital expenditure between 1990 and 2010 on sewers. A further £4.7 billion is planned for the period to 2015. Whilst there are some very old sewers, the average age of sewer networks in England and Wales is around 65 years.

As defined by the Flood and Water Management Act, flooding from sewers only falls within the scope of this strategy where it is wholly or partly caused by an increase in the volume of rainwater (including snow and other precipitation) entering or otherwise affecting the system. This is most likely to occur where the sewer has a dual purpose, carrying both surface water run off and foul sewerage and the combined flow entering the system exceeds the capacity of the sewer.

There are almost 25,000 intermittent discharges to main rivers, ordinary watercourses and the sea from the sewer network in England and Wales. Over the last 20 years there has been significant expenditure by the water industry to tackle the issue of flooding from intermittent discharges and to ensure they are operating to the standards expected of them. The main causes of flooding of properties from sewers are capacity 'pinch points' in the networks and blockages. Between 2000 to 2010 water companies improved their networks benefiting 15,000 properties that, prior to this work, had a 1 in 10 annual likelihood of internal flooding. This left around 5,000 known properties with a high likelihood of internal flooding. Companies will invest to reduce the number of these properties by a quarter by 2015 at an average cost of more than £200,000 per property.

Coastal erosion

Of the 4,500 km of coast in England, approximately 1,800 km is at risk of coastal erosion (approximately 340 km of which is defended). It is estimated that approximately 200 properties are currently vulnerable to coastal erosion but by 2029, up to 2,000 residential properties, and 15 km of major road and railway may become vulnerable⁽¹²⁾. This means that they are in areas that may be subject to coastal erosion in the future depending on how quickly the coast changes. It is important to remember that the consequences of coastal erosion will normally be the permanent loss of land, buildings and infrastructure.

Combined risks

The individual risks of flooding and coastal erosion can, and frequently do, combine to change the overall level of risk. For example flooding from rivers and the sea may combine locally with that from ordinary watercourses and surface water. In addition high tides can interact with high river flows to increase the risk of flooding around estuaries. There may also be other sources of risk that need to be taken into account, for example flooding from caves or mines. Assessment of these combined risks is

complex and the Environment Agency and Defra are working to develop tools to support and improve this work. It is still, however, essential that combined risks are considered in the development of FCERM plans and local strategies. Local information on past flooding, for example from surface water and groundwater, can support this work and a proportionate approach should be taken to improving this understanding where required by collecting additional data and carrying out modelling of local systems.

The consequences of flooding

The high level information presented in this chapter provides an overview of the consequences of flooding by assessing the number of properties located in areas at risk. This may not fully represent the risks, for example to life, infrastructure or businesses. In prioritising FCERM actions it is important to consider the consequences of flooding in more detail. Risk to life should be of primary importance alongside other factors such as damage to property, business and the economy, infrastructure and the environment, including the historic environment. The numbers of properties in at risk areas may be, at least in part, an indicator of risk to life and property but additional important factors to consider include the depth and rate of flow of floodwater, the length of time an area remains flooded and the potential for contamination of the flood water. The depth and rate of flow of floodwater can be particularly important in assessing risk to life as deep, fast flowing floods such as those that may arise from coastal flooding, steep, upland rivers or from reservoir failure can present an immediate risk to life. Work being carried out to develop greater understanding of the areas of significant flood risk, and the associated flood flow rates, under the Flood Risk Regulations (2009)⁽¹³⁾ will help to improve understanding of the areas where risk to life may be greatest.

2.3 Future changes to risk

Pressures such as climate change, deterioration in the condition of risk management assets, new development and changes in land use can increase the probability and consequences of flood and coastal erosion. Figure Four shows some of the factors that can change these risks.

Climate change and sea level rise

The climate is changing and this is likely to have an impact on flooding and coastal erosion. Sea levels are rising and winter rainfall may become more intense. Changes in weather patterns and, in particular, more torrential rainfall is likely to increase flood risk from surface water and ordinary watercourses as well as rivers. Today, around 490,000 properties face a 1 in 75 chance (in a given year) of flooding from rivers and the sea. In reviewing future risk, the Environment Agency report *Investing for the future*⁽¹⁴⁾ suggested that if overall investment remains at 2009 levels (in 'cash terms') and if there is no additional development in the areas at risk, by 2035 there will be an additional 350,000 properties, 280,000 of them residential, in areas with a 1 in 75 or greater annual chance of being flooded.

Rising sea levels mean that waves and storm surges could cause greater coastal erosion. Changes to the currents acting on the coast could also lead to changes in the movement of coastal sediments, affecting both coastal deposition and erosion. This could expose new risks from coastal flooding, lead to a greater risk of coastal defences failing and increase the need for maintenance work on defences and more extensive warning systems.

Population change, development and land management

Providing for the housing, business and associated needs of an increasing population may increase the consequences of a flood or coastal erosion incident. The population of England is predicted to increase by 10 million by 2030⁽¹⁵⁾, increasing the need to provide homes and infrastructure. Unless this development is carried out appropriately, it could increase risks by placing more people and property in areas at risk. As a result it is essential that spatial planning ensures that new developments take flood and coastal erosion risk fully into account, and are safe from, do not increase, and where possible reduce risk over their lifetimes. It is also essential that appropriate flood forecasts and warnings are provided to enable individuals and communities to respond effectively.

Land management and development can have significant effects on the movement of water within a catchment. Development or changes in land use in areas that themselves may not be at risk of flooding can reduce or prevent rainwater infiltration into the ground, speed up surface water run off and as a result increase the risk of flooding downstream. This can also apply to rural and agricultural land use where changes in vegetation may cause similar impacts.

The cost of damages caused when properties are flooded is also likely to increase with inflation and in line with general increases in wealth over time as the value of goods and fittings in households and businesses increases. As a result, even if the likelihood of flooding were to decrease over time, the consequences may still increase as the value of property and contents continues to rise.

Important national infrastructure

The summer 2007 floods highlighted the need to make sure that infrastructure such as water and electricity supply services are suitably resilient to flooding and coastal erosion. The Cabinet Office has published a framework for achieving this. The *Strategic Framework and Policy Statement on Improving the Resilience of Critical Infrastructure to Disruption from Natural Hazards*⁽¹⁶⁾ establishes an interim standard for resilience to flooding that critical infrastructure should meet. The framework emphasises the need for infrastructure providers to maintain overall service provision and to take account of the importance of specific sites within infrastructure networks. The Cabinet Office has also recently published for consultation guidance on improving the resilience of critical infrastructure and essential services *Keeping the Country Running: Natural Hazards and Infrastructure*⁽¹⁷⁾.

Asset condition

As set out in Section 2.2, the existing public and private network of FCERM infrastructure is significant. While the vast majority of these assets and systems are maintained to appropriate standards, there are two major issues to consider. First, the standard of protection provided by existing structures will decline as the climate changes and the probability of events that could cause floods or erosion increase. Second, assets will reach the end of their design life and need replacing, refurbishment or greater levels of maintenance. While this gives an opportunity to upgrade assets and systems to meet future challenges, it also means that the costs of maintenance and replacement are likely to rise.

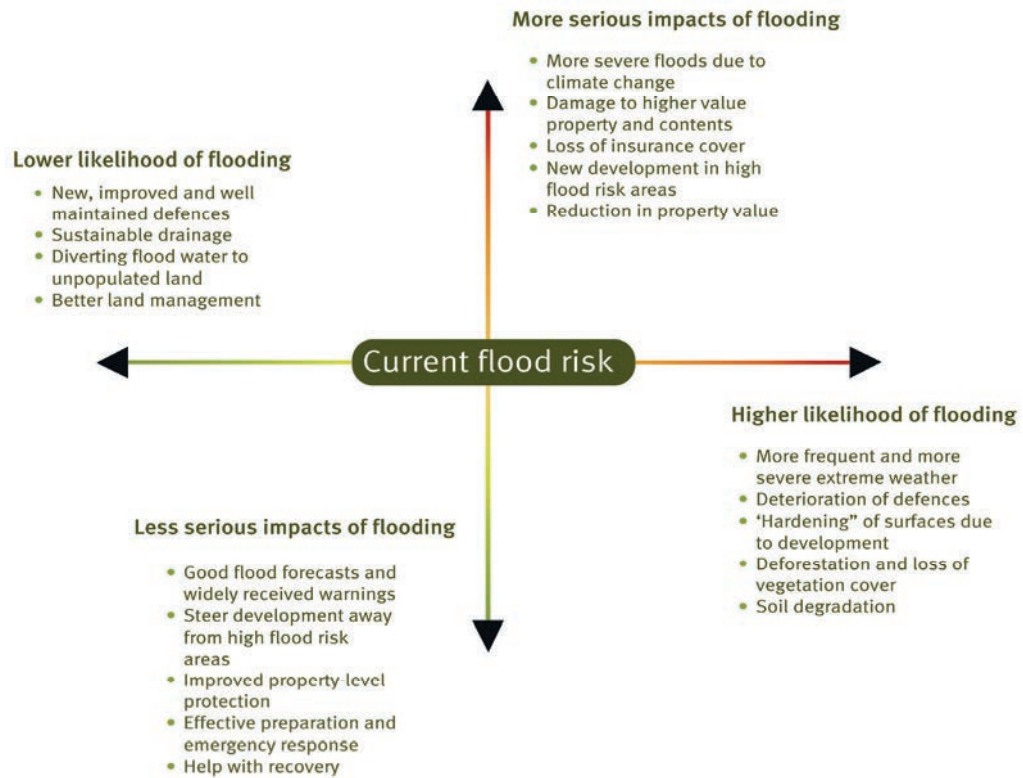


Figure Four: Managing flood and coastal erosion risk – addressing likelihood and impacts

3 Managing flood and coastal erosion risk

3.1 Strategic aims and objectives

This strategy sets out how the Flood and Water Management Act will be implemented. It also takes forward the findings of the Pitt Review of the summer 2007 flooding and the work to develop a risk-based approach to flood and coastal erosion management.

The overall aim of the strategy is to ensure the risk of flooding and coastal erosion is properly managed by using the full range of options in a co-ordinated way.

Communities, individuals, voluntary groups and private and public sector organisations will work together to:

- **manage the risk to people and their property;**
- **facilitate decision-making and action at the appropriate level - individual, community, or local authority, river catchment, coastal cell or national;**
- **achieve environmental, social and economic benefits, consistent with the principles of sustainable development.**

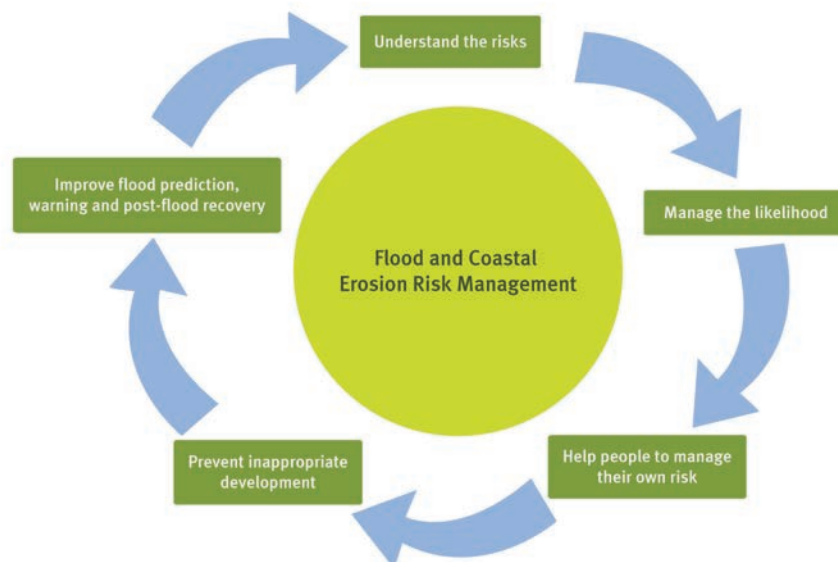


Figure Five: Managing flood and coastal erosion risks

As illustrated in Figure Five, the Government will work with individuals, communities and organisations to reduce the threat of flooding and coastal erosion by:

- understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;

- avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
- building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;
- increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient;
- improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

Future actions under each of these headings are summarised in Section 3.3.

3.2 Guiding principles

Flood and coastal erosion management may mean that difficult decisions have to be taken on where risk management activities can and can't be carried out at both national and local levels. These decisions, and the processes by which they are taken, will be guided by a number of high-level principles. These are outlined below:

Community focus and partnership working

The risk management authorities should work in partnership with communities to understand the community perspective of flooding and coastal erosion, help communities understand and actively prepare for the risks, and encourage them to have direct involvement in decision-making and risk management actions. This includes giving communities a bigger say in what action is taken, greater responsibility for managing their own risks and decisions on local funding priorities, and as a result greater accountability for the level of safety and protection achieved and the way in which the risks are managed. The aim is to ensure that decision making and ownership of risk management measures are as local as possible but within a catchment, coastal cell and national framework that ensures a fair allocation of funds and avoids the transfer of risk elsewhere without prior agreement. Lead local authorities will have a co-ordinating and strategic role taking on board the input of other local bodies and communities through consultation and public scrutiny and overview proceedings. To do this they will need to work closely with Regional Flood and Coastal Committees (RFCCs).

Communities living and working in areas at risk should be represented within any local flood risk management partnerships that are formed, for example through attendance by members of local flood action groups. They should also be involved in community resilience initiatives. Lead local flood authorities, working together with RFCCs, will also be able to consider how both the costs and benefits of investment made as part of local flood risk management strategies should be spread between geographical areas, communities and sectors. Involving representatives of communities at risk can help inform local decisions on what is needed and who should be asked to contribute towards the costs of investment, so that costs and benefits are shared fairly overall. Funding decisions will be less centralised than under the current system, and there will be a clear basis for local participation in shaping risk management via consultation on local strategies and LLFA membership of RFCCs.

Partnership working is also required to ensure that risk is managed in a co-ordinated way beyond authority boundaries, for example across catchments or along the coast, with lead local flood authorities working together collectively, for example in a similar way to the collaborative approach adopted by coastal groups, and as part of Regional Flood and Coastal Committees. By working in partnership with communities, risk management authorities will achieve clearer understanding of the issues, and be able to bring together those best placed to develop and provide solutions. This will build on the accountability of lead local flood authorities and take advantage of the flexibility for risk management authorities to enter into agreements with others to carry out work on their behalf if they so choose. The key aims should include the identification of synergies and efficiencies and ways of maximising these, the development of better links with other related work, and the promotion of better sharing of information and expertise.

A catchment and coastal “cell” based approach

In understanding and managing flood and coastal risks locally, it is essential to consider the impacts on other parts of the catchment or coast. Activities must seek to avoid passing risk on to others within the catchment or along the coast without prior agreement. This agreement could, potentially, include the provision of funding by upstream communities for actions and measures carried out by others to manage downstream risks. The catchment or coastal cell approach is also key to managing risks at source and achieving wider benefits through more integrated water management and increasing the opportunity for developing new sources of funding as well as pooling resources and expertise. Catchment flood management plans (CFMPs) and shoreline management plans (SMPs), or equivalent, provide an important building block for this co-ordination and the CFMP and SMP boundaries are shown in Annex 1.

Sustainability

Flood risk and coastal erosion management authorities should support communities by managing risks in ways that take account of all impacts and the whole-life costs of investment in risk management. The risk management solutions should be forward-looking, taking account of potential risks that may arise in the future and being adaptable to climate change. They should also work with natural processes where possible and enhance the environment. More sustainable approaches to FCERM generally work with natural process and include managed re-alignment and upland grip blocking as shown in Figure Seven. These are often more resilient to extreme events and provide better value for money over the long-term than more traditional approaches based on structural or engineered, interventions.

Both flooding and coastal erosion result from natural processes and can have positive benefits. Much of the unique landscape and wildlife in England depends on a certain amount of flooding or coastal erosion. The relatively high proportion of Grade One agricultural land at risk of flooding is no coincidence, as the flooding of land with nutrient-rich sediment creates fertile soil. In many cases landowners are farming the flood plain, and in other areas land that has been reclaimed from the sea. Adopting more sustainable approaches to the management of flood and coastal erosion risks can greatly improve the environmental condition of rivers, wetlands, coastal areas, and the social and economic circumstances around and within settlements. The Act includes a requirement for Local Authorities, highways agencies and IDBs to contribute towards sustainable development and separate guidance is being provided by Defra alongside this strategy on how this may be achieved.

Proportionate, risk-based approaches

It is not technically, economically or environmentally feasible to prevent flooding and coastal erosion altogether. A risk-based management approach targets resources to those areas where they have greatest effect. Risk management measures consider both the probability over time of a flood or coastal erosion happening and the consequences that might arise if it did, for example by assessing the average annual damages that arise from floods or coastal erosion. To do this the sources, pathways, receptors and consequences of risk need to be understood and addressed as appropriate to manage all of the factors that combine to create risk. Further detail on this approach is available in the *Guidelines for environmental risk assessment and management* (2000)⁽¹⁸⁾.

Such an approach involves using a tiered assessment i.e. starting at a high, screening level and in stages becoming more detailed to address the risks identified. It seeks to make risk management more straightforward, removing unnecessary barriers while ensuring that legal and Government policy requirements are met. All aspects of risk management should be carried out in a proportionate way that reflects the size and complexity of the risk and society's ability to manage it. Investment in managing risk, and who pays for it, should reflect the benefits that result.

Multiple benefits

As well as reducing the risks to people and property, FCERM can bring significant economic, environmental and social benefits. It can enhance and protect the built, rural and natural environments, cultural heritage and biodiversity by preventing loss and damage to habitats and heritage assets and reducing pollution, for example through the use of Sustainable Drainage Systems (SuDS). It can contribute to regeneration and income generation, protect infrastructure and transport links, and contribute to economic growth. It is important that communities are able to shape risk management actions to take account of local priorities, and that this is supported, where appropriate, by local contributions to achieve additional benefits that might not be possible otherwise. This principle should also apply to other activities, for example development, land use or infrastructure planning where FCERM benefits may also be achieved alongside the main objectives.

In all instances, flood and coastal risk management should avoid damaging the environment, including the historic environment, and wherever possible work with natural processes and always seek to provide environmental benefit, as required by the Habitats, Birds and Water Framework Directives. This may include providing new habitats, which may not be directly linked to FCERM schemes, to compensate for those that are lost as a result of actions to protect people and property. Treasury policy guidance on funding, Defra policy guidance on environmental benefits, and the Environment Agency's *Flood and coastal erosion risk management appraisal guidance*⁽¹⁹⁾ give more information on this and how it should be achieved.

Beneficiaries should be encouraged to invest in risk management

The benefits achieved when flood and coastal erosion risks are managed are in many cases localised and lead to personal or private gain through the protection of specific individuals, communities and businesses. They can also be public, through the reduction of future costs to society arising from incident recovery. The private as well as public nature of the benefits suggests that costs should not fall to the general taxpayer alone. If they did, future plans would always be constrained by what central

government could provide. Plans would also be subject to national controls to ensure value for money to the taxpayer, limiting the scope for local influence. If costs are borne by national budgets alone, there would be a lack of local incentive to take sensible steps to reduce risk where possible, to avoid actions that might increase it, and to keep the costs of risk management actions proportionate. Overall, there is the opportunity for significantly more risk management activity to take place if alternative sources of funding can be secured in each area to reflect the local benefits that would be delivered. Any funding found locally can supplement the amounts available nationally and mean as many communities as possible can be protected. In his review of the summer 2007 flooding, Sir Michael Pitt suggested that better aligning beneficiaries with those that pay would create a more efficient and responsive system. To do this he recommended that *'Government should develop a scheme that allows and encourages local communities to invest in flood risk management measures'*. He also said that developers, in potentially increasing local flood risk, should *'make a full contribution towards both the costs of building and maintaining the necessary defences.'* In taking this recommendation forward, the Government has made clear that *"we cannot continue all of the work that the Environment Agency has historically done at the taxpayer's expense. Government investment in flood and coastal erosion risk management is significant, but we need to ensure that we get best value for money"*.

3.3 Achieving the objectives

The risk management authorities and other organisations involved in flood and coastal erosion risk management will take forward the aims and objectives set out in more detail below. To support this work, the Environment Agency and Defra will continue to work with others to sponsor a collaborative FCERM research programme to make sure that all involved in FCERM are able to benefit from world-class knowledge and science and have access to current good practice and risk management tools.

3.3.1 Understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them

Understanding risks

Flood and coastal erosion risks can only be managed effectively if they are properly understood. Key to this is estimating the risks through assessing data, information and modelling and understanding the uncertainty in the predicted levels of risk. National and local understanding of flood and coastal erosion risks will be developed as follows:

- The Environment Agency will develop and maintain national information on current and future risks arising from all sources of flooding and coastal erosion. This will be supplemented by using information on local risks from lead local flood authorities. The Environment Agency will assist the development of local information through the development of tools and advice. IDBs also have specific knowledge and understanding of local risks in lowland and pumped catchments. Bringing this together in local strategies and maintaining national information will make sure that risks are properly understood and help to identify management priorities and allocate resources. It will also help in the development of strategic plans such as catchment flood management plans and shoreline management plans and assist lead local flood authorities in developing local flood risk management strategies and other plans that may affect or be affected by FCERM.

It will also support preparation of multi-agency flood plans by the 41 local resilience forums in England that are responsible for planning how to respond to flood incidents.

- Lead local flood authorities will develop and maintain information on flooding from ordinary watercourses, surface water and groundwater in the areas they cover. Where they are in place IDBs are likely to be a significant source of local information on these risks. Effective mapping of flood risk, with improved mapping of surface water and related flood risks alongside the information on river and sea flooding risk maintained by the Environment Agency, will help support the work of local planning authorities in making effective risk-based planning decisions. These will also contribute to and take account of the national information provided by the Environment Agency and information from CFMPs, SMPs and other plans as appropriate. Similarly strategic flood risk assessments (SFRAs) and coastal change vulnerability assessments produced in support of land-use planning decisions may form an important part of this work.
- Coastal erosion risk management authorities will work alongside the Environment Agency to develop and maintain coastal flood and erosion risk information. This will contribute to national information maintained by the Environment Agency and promote understanding of these risks enabling them to be taken into account in planning coastal protection and management activities.
- The Environment Agency will maintain and publish advice on risk mapping, modelling and data sharing and work alongside lead local flood authorities and other organisations to make sure that the appropriate data and information is shared consistently.
- Where appropriate, flood and coastal erosion risk will be communicated using summary information that can be clearly understood. The Environment Agency will support this where it is able to by providing additional information and guidance to help others assess their specific flood risks.
- The Environment Agency, lead local flood authorities and coastal erosion risk management authorities will establish and maintain a register of assets and other features that help to manage risks.

To help achieve the above, a risk-based approach to data collection should be adopted (for example, assess the biggest risks first).

Planning risk management

Flood risk and coastal erosion management activities require careful planning to ensure that appropriate, sustainable, options are selected and that they are implemented properly. Actions should be planned effectively, for the long-term, and provide a clear picture of what will be done to manage risk and provide multiple benefits. This may include, for example, linking with other plans such as river basin management plans (RBMPs) and supporting biodiversity, habitat creation or improving water quality. The general relationship between FCERM strategies and other plans is shown in Figure Six. Plans should identify the opportunities to manage the risks of flooding and coastal erosion where possible unless there are good reasons not to and set out where risk management authorities will take action. These plans are fundamental in helping communities understand the risks they face, what they can do to manage them and how the risk management authorities and other organisations may help. They are also key to ensuring that risk management actions are well co-

ordinated across catchments and along the coast. It is essential that communities are involved in the development of these plans and that combinations of options should be considered and selected as required so that:

- the negative consequences of flood or coastal erosion are minimised;
- the likelihood of an event causing loss of life and damage is reduced, and;
- opportunities to improve the environment are taken.

The following actions will aim to make sure that innovative long-term strategic plans and local strategies are put in place to manage risks both nationally and locally:

- the Environment Agency will ensure that strategic plans, including catchment flood management plans (CFMPs) and shoreline management plans (SMPs) or their equivalents, are in place and monitored to assess progress. The plans will set out high-level current and future risk management measures across catchments and along the coast.
- the Environment Agency will, through RFCCs, seek to ensure consistency between strategic and local plans.
- lead local flood authorities are required by the Act to develop, maintain and monitor local flood risk management strategies. Where significant flood risks have been identified the lead local flood authority will need to set out risk management plans as required by the Flood Risk Regulations and these should form a central part of the local strategy in the areas in question. These strategies will build on CFMPs and SMPs and inform future developments of these plans (or their equivalents) to ensure that flood and coastal erosion risk management activities are co-ordinated, facilitate sustainable risk management and make it easier to deliver multiple benefits.
- local resilience forums (LRFs) will develop, maintain and monitor multi-agency flood plans to plan for coping with the impacts of floods when they happen. LRFs involve the emergency services, local government, infrastructure operators and key national organisations such as the Environment Agency.
- coastal erosion risk management authorities and the Environment Agency will implement, maintain and monitor shoreline management plans to understand and manage coastal flood and erosion risks. Where appropriate, these will also feed into the development of local flood risk management strategies.
- Regional Flood and Coastal Committees will have a major role in co-ordinating FCERM. They bring together levies raised from local authorities and use them to promote FCERM activities in their area. They will review and approve Environment Agency plans and expenditure. They will also have the opportunity to assess the extent to which the FCERM programme is well co-ordinated across catchments and along the coast and takes into account the likely future impacts of climate change. The Environment Agency will publish and regularly update its programme for implementing new risk management schemes and maintaining existing assets.
- in managing the risks of flooding particularly from ordinary water courses, surface water and groundwater, lead local flood authorities and other authorities will need to work in partnership to co-ordinate their risk management activities. The Environment Agency will, where it is actively involved in capital investment, maintenance and the provision of warnings, continue to engage fully with the local risk management authorities and communities.

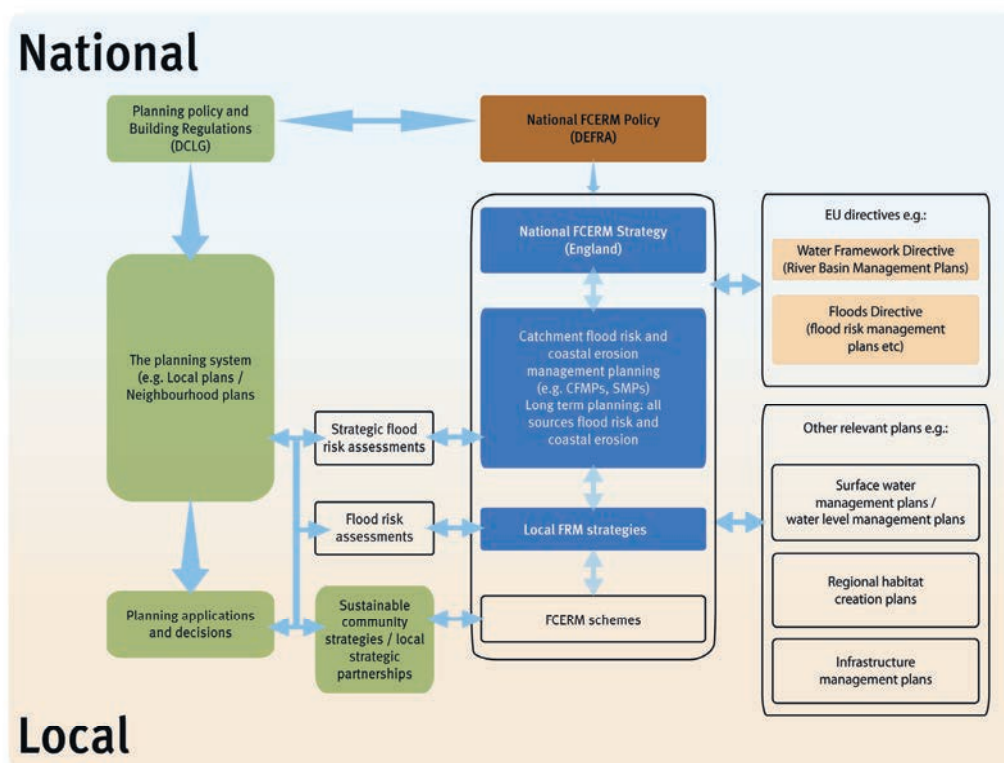


Figure Six: FCERM strategies and plans and their relationship with other planning initiatives

To support the achievement of the above, the organisations concerned will need to:

- work in partnership with others to make sure the plans and strategies are consistent with, and developed in conjunction with, related plans in the same area including local and neighbourhood development plans. Making decisions on new development and investments will be an important part of managing long-term risk and can provide opportunities for better management of flood risk in an area. Plans should also be co-ordinated across the catchment or along the coast, have buy-in from those responsible for implementing them, and should not transfer adverse impacts to other areas without agreement. They should also enable better linkages with other land-management plans and other activities, including land use planning, infrastructure investment plans and agriculture to ensure the best use of pooled resources;
- appraise and adopt, as appropriate, the full range of measures that may be available to manage risks. These should include consideration of both structural and non-structural measures, for example, using combinations of flood storage, source control and SuDS, reducing sewer misconnections (for example, where a surface water drain has been mistakenly connected to a foul sewer, increasing the risks of flooding from sewers), avoiding inappropriate development, better management of surface water flows to avoid damage to property, building and maintaining risk management assets and systems, maintaining the flood flow carrying capacity of channels, flood warnings and individual property protection and resilience. Organisations should also take account of likely changes in these risks in the future. This will include assessing the whole-life cost of a measure, the use of different levels of risk management and the remaining useful life of existing systems;

- consider the wider carbon costs or benefits of adopting different FCERM measures and reduce the carbon costs of the measures used, in both their construction and operational life, to contribute to overall carbon emissions reductions;
- contribute to the achievement of sustainable development, balancing the needs of society, the economy and the urban, rural and natural environment, taking account of the cultural heritage and seeking to secure environmental benefits;
- ensure that the costs of, and the schedule for carrying out, measures are clear and understood and that the measures selected reflect expected climate change impacts on future risk;
- meet legal requirements to assess the impacts of strategies (for example strategic environmental assessments or appropriate assessments as required by the Habitats Directive);
- record the measures being implemented and provide local information to support the Environment Agency in developing the national understanding of risk and to meet the requirements of the Flood Risk Regulations. This should include information on the reduced risk to properties and infrastructure as well as other assets (for example businesses, hospitals, schools) and the use of any non-structural measures (for example, flood awareness, emergency planning).

Risk management in rural areas

- It is recognised that rural and sparsely populated areas can face serious and significant risks from flooding and coastal erosion. Whilst the provision of major structural interventions to manage risk in rural areas may be less cost-effective than in more populated areas, the new approach to national funding will value the protection of rural and urban areas on an equal like-for-like basis. Flood and coastal erosion risk management authorities, including the Environment Agency, will continue to ensure that Treasury and Defra guidance on appraisal is followed when considering central government funding. The purpose of this is to ensure that taxpayer money is invested to best effect and the impacts of proposals on all sections of society, the economy and the environment are taken into account. Defra's policy statement on FCERM scheme appraisal underlines the need to value agricultural land and the damages that can occur as a result of flooding and coastal erosion in assessing risk management options. Food security is taken into account through the economic appraisal of decision and investment options. Values are calculated for the damages avoided to agricultural land, crops and productivity together with impacts on infrastructure and other assets that play a role in growing food and making it available to consumers. Specific guidance on the valuation of impacts on agricultural land was updated by Defra in 2008 following consultation with the rural and farming stakeholders. This guidance takes account of the decoupled Single Payment Scheme introduced in the UK from 2005 and will be amended as required in response to any further significant changes.

3.3.2 Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks

The Environment Agency will work with local authorities and developers to avoid inappropriate building or redevelopment in areas of high flood or coastal erosion risk. Key to this is ensuring that risks are effectively identified in local strategies and that there is good co-operation between the lead local flood authority and the planning authority (where these are different). This should ensure that local development plans and other plans include appropriate policies and avoid inappropriate development in areas at risk.

Proper consideration should be given to FCERM issues in managing land use and developing/re-developing areas within a catchment or along the coast that are not directly at risk, to ensure that risks are not increased in other areas without prior agreement.

3.3.3 Maintaining and improving FCERM systems to reduce the likelihood of harm to people and damage to the economy, environment and society

A range of measures can be taken to reduce the likelihood of a flood or coastal erosion event causing harm to people and economic and environmental damages. The use of these measures will depend on local circumstances and it is essential that all options are considered in planning action. Key measures include:

- the provision of funding from central government towards the construction and maintenance (including river and watercourse channel maintenance) of risk management assets. Funding raised through general taxation will continue to be provided to reduce the likelihood of flooding and help to prevent coastal erosion where sustainable and economically justified. An appropriate balance will be maintained between investment in new systems and maintaining/upgrading existing assets. In all cases, projects can seek to provide wider benefits for the community, for example improving the natural and built environment, preserving cultural heritage, supporting tourism, agriculture, economic development, and recreation. Forming partnerships with beneficiary groups can help to secure any additional funding necessary to achieve these aims.
- considering alternative options for the operation, maintenance or replacement of FCERM assets by the Environment Agency or other public authorities, where public funding cannot be justified. This may include other organisations or individuals adopting systems or single assets (explored in more detail in Chapter Five) or, where possible, through providing support to the affected communities to adapt to the changes that may result. Defra and the Environment Agency have supported local authorities and coastal landowners in developing new approaches to community adaptation and risk management in areas affected by coastal change. Some communities, for example, have agreed to operate flood gates instead of relying on public authorities to do it.
- providing support from national and local government for local solutions and innovation, where possible minimising barriers (for example, in administration) that may prevent landowners, community groups or individuals taking steps to manage risks.

- using good practice in the design and management of FCERM assets and systems. This includes understanding and managing the whole-life costs of assets, for example using an 'asset management cycle' approach.
- using innovative approaches to managing risk may be undertaken alongside or instead of more traditional approaches. Their use may be co-ordinated across catchments or along the coast and may include property level protection measures, land management options to slow down the flow of water from the upland parts of a catchment, promoting flood storage or creating inter-tidal habitats to store tidal flows and dissipate wave energy to reduce risks. FCERM systems are interlinked and their development and management should be carried out collaboratively to ensure these links are maintained effectively.
- using Sustainable Drainage Systems (SuDS) in new developments and re-developments to manage surface water flood risk. The Act (once commenced) provides for the design, construction, operation and maintenance of these systems to be approved, where required, by the SuDS approving body as meeting national standards for sustainable drainage. The management of surface water should be considered early when designing a development to ensure that the best possible drainage system is built. Use of public space and the multifunctional use of open space could be considered as part of preparing local flood risk management strategies to reduce the potential land take from SuDS for new developments. The aim of these measures is to minimise the impacts of development on flood risk and to improve water quality. They will also have other benefits such as to local amenity and biodiversity. New or re-developments should also consider how damages and risk to life from flooding can be avoided through better design and layout.
- implementing measures so that they do not compromise, and where possible make it easier, for emergency services, local communities and infrastructure operators to cope with and respond to floods when they happen.
- maintaining reservoir safety will be risk-based. Only reservoirs classed as high-risk will be fully regulated, although all reservoirs above a threshold capacity must be registered. This threshold is currently 25,000m³ and the Act provides for this to be reduced to 10,000m³ once the relevant sections are commenced. Where required, a reservoir flood plan must be produced and incidents that could result in flooding must be reported. The Environment Agency will work with Defra to define high-risk reservoirs and reportable reservoir incidents, and provide advice for owners/managers of high-risk reservoirs to help them comply with the Act. In cases of persistent non-compliance, the Environment Agency will take appropriate enforcement action in accordance with the Regulators' Compliance Code.
- the Environment Agency continuing to develop and implement more efficient approaches to the procurement of capital schemes and making contractual frameworks accessible to other risk management authorities.

Achieving wider environmental objectives and other benefits

As set out in Section 3.2 flood risk and coastal erosion management measures provide a significant opportunity to improve the natural, rural and built environment, helping to shape places to provide better environments for people and businesses as well as provide habitats for wildlife and improve biodiversity. The Flood and Water Management Act also places a duty on the risk management authorities to aim to make

a contribution to sustainable development. More detailed guidance on sustainable development and FCERM will be made available alongside this strategy by Defra.

To achieve wider environmental objectives and other benefits, the measures used to manage all flood risks (including local sources of flooding) and coastal erosion will work with natural processes wherever possible and be based on partnership working with local communities. Working with natural processes can include taking action to manage flood and coastal erosion risk by protecting, restoring the natural function of catchments, rivers, floodplains and coasts (see Figure Seven). This could, for example, involve using farmland to store flood water temporarily, reinstating washlands and wetlands to store flood water away from high risk areas or allowing cliffs to erode to provide sediment that may be deposited elsewhere. Other techniques include protecting and restoring natural river, estuarine and coastal systems and features. The maintenance and restoration of a range of ecosystem services, or natural functions of the environment, can provide valuable additional benefits including:

- water quality improvements through reductions in run-off and diffuse pollution;
- water resource provision through aquifer recharge;
- mitigation of and adaptation to climate change through measures such as wetland creation and coastal and fluvial realignment, and
- the provision of urban biodiversity and amenity green spaces through sustainable drainage systems (SuDS).

FCERM projects should minimise damage to and, where possible improve, the local natural, cultural and built environment. Where it is not possible to avoid damage to protected features (for example designated sites, protected habitats and historic buildings) as a result of FCERM activities it may be necessary to provide compensatory measures to comply with legal requirements. Sections 38 and 39 of the Flood and Water Management Act provide powers for the Environment Agency, local authorities and IDBs to manage flooding or coastal erosion in the interests of nature conservation (including the conservation of the landscape), preservation of cultural heritage, and people's enjoyment of the environment or of cultural heritage. In carrying out such works, authorities must have regard to this strategy and the local flood risk management strategy as well as consulting those affected. The benefits of the work should outweigh any harmful consequences to: human health; the social and economic welfare of individuals and communities; infrastructure, and the environment (including cultural heritage). These provisions are important to ensure a proper balance between sustaining and enhancing the environment and reducing the risks to homes and businesses.

Building links with other plans such as RBMPs and infrastructure investment plans can help this approach and secure wider sources of funding, for example from agri-environment schemes and with business and industry. The role of FCERM schemes in reducing the impacts of climate change should also be considered, for example in providing new coastal and wetland habitats that may be more resilient to future change.

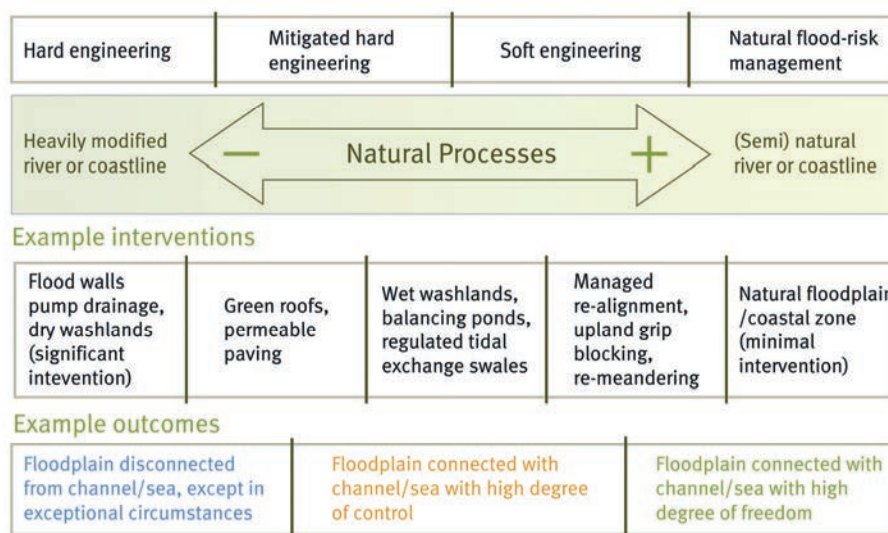


Figure Seven: Example FCERM interventions and outcomes

Obligations set out through the EC Water Framework⁽²⁰⁾, Habitats and Birds Directives^{(21) (22)} and other domestic commitments that link to FCERM must be met. These include:

- environmental objectives under the Water Framework Directive, including conservation objectives for protected areas under Article 4.1;
- Sites of Special Scientific Interest (SSSI) conservation objectives - as public bodies, every flood authority has a duty under Section 28G of the Wildlife and Countryside Act 1981 to take reasonable steps, consistent with the proper exercise of its functions, to further the conservation and enhancement of the features for which the SSSI was designated;
- physical restoration of lakes and rivers to meet both SSSI objectives for designated sites and Water Framework Directive objectives for other water bodies;
- UK national and local Biodiversity Action Plan (BAP) targets - Section 40(1) of the Natural Environment and Rural Communities Act 2006 places a duty on flood authorities to have regard, so far as is consistent with the proper exercise of their functions, to conserve biodiversity, including restoring or enhancing species populations or habitats. FCERM activities should involve no net loss of BAP habitat;
- protected landscapes - public bodies must have regard to the conservation and enhancement of the natural beauty, wildlife and cultural heritage of the English National Parks and the Broads and promote opportunities for the understanding and enjoyment of the special qualities of those areas by the public as set out in the National Parks and Access to the Countryside Act 1949, and the Norfolk and Suffolk Broads Act 1988. Under Section 85 of the Countryside and Rights of Way Act 2000, authorities must contribute where possible to conserving and enhancing the natural beauty of areas of outstanding natural beauty where they are performing functions that may relate to or affect land in these areas. The national and local strategies will also need to take into account the European Landscape Convention.

3.3.4 Building public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face

People who live and work in flood and coastal erosion risk areas have a critical role in managing the risks they and their communities face. This role will, however, need to be supported by the risk management authorities. This section identifies some of the key areas that the strategy will take forward.

Key measures include:

- Communities and individuals in areas at risk of flooding and coastal erosion should take responsibility for understanding the risks and, where appropriate, take steps to protect themselves and others. Examples of these actions include: signing up to the Environment Agency's flood warning system; ensuring they have adequate insurance; preparing a flood plan for their household or business and preparing community flood action plans; creating or joining a local flood or coastal action group; taking steps to protect their property; monitoring and reporting on the condition of FCERM assets; ensuring that they maintain FCERM assets they own and maintain watercourses where they own the adjoining land.
- The Environment Agency, lead local flood authorities and coastal erosion risk management authorities will work in partnership with communities to build awareness of flood and coastal erosion risks. The aim of this work is to help communities to participate as far as possible in FCERM. To do this, they will publish up to date information on risks and liaise with those groups who may be better placed to provide links with communities such as local flood action groups or other organisations that represent the views of those living and working in areas at risk. This includes activities such as: developing and sharing good practice in risk management with communities, training for community volunteers so that they can raise the awareness of risk in their community, or helping the community to prepare flood action plans. Where appropriate, this work should link with the Cabinet Office's initiative to develop wider community resilience to threats and hazards.
- Communities, assisted by coastal erosion risk management authorities and lead local flood authorities, should plan for the future and take appropriate steps to adapt to changing flood and coastal erosion risks. Defra, the Environment Agency and others will support community adaptation by working with them to develop understanding of how they can adapt to change, the costs and benefits of different approaches, and by providing practical approaches and examples that can be shared. In particular, these should focus on community adaptation planning and engagement and implementing innovative adaptive solutions such as land use management change.
- Householders and businesses at flood risk should take the appropriate steps to better protect their properties through property level resistance and resilience measures. Defra, the Department for Communities and Local Government (DCLG), the Environment Agency and lead local flood authorities will support this work by raising awareness and understanding and assisting the wider take up of flood resistance and resilience measures to reduce damage to buildings. These measures seek to prevent water from entering a property and/or seek to reduce the damage that may happen if water does get in.
- Flood insurance is a means of sharing the costs of flooding events between policy holders. Flood risk has long been included as standard in most building and

contents insurance policies. As with most types of insurance, policy terms may reflect the level of risk in each case, including actions taken by individuals or risk management authorities to reduce it. The Government and insurance industry both aim to support the wide availability of insurance beyond the expiry of the Statement of Principles⁽²³⁾ in 2013.

3.3.5 Improving the detection, forecasting and issue of warnings of flooding, co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding

Flooding can never be prevented entirely. An important part of managing these risks at the national, local and individual level, is ensuring an effective response to incidents when they do happen. A well integrated approach to flood detection and forecasting will help ensure that flood warnings are issued in good time so that individuals, businesses, the public and the emergency services can minimise the potential loss of life and damage to property and infrastructure. Prompt action to minimise the consequences is the most effective way of limiting the immediate and longer term impact on individuals' well-being and affected areas' economic prosperity.

To achieve this, the Environment Agency and the Met Office will continue to work together to develop and improve the national flood detection and forecasting services provided by the Flood Forecasting Centre. In addition, the Environment Agency will continue to develop and improve the flood warning service working with the other risk management authorities to develop warnings for surface water flood risks. This will include providing:

- more accurate forecasts of flooding from all sources (where technically possible) that are meaningful and understandable to those who rely on them to make decisions;
- warnings and flood information that are as geographically specific as possible so that all recipients know what to do;
- longer lead times for flood forecasts and warnings to give emergency responders and the public more time to respond to and prepare for floods;
- more innovative ways of sharing locally specific forecasts, warnings and flood information with people, and
- by linking and combining available flood information in a clear and easily accessible way to improve incident response and avoid confusion.

The overall aim is to provide people at risk of flooding from rivers, ground and surface water and the sea with appropriate, intuitive, targeted and effective flood information, forecasts and warnings that prompt the right actions and reduce the impacts and consequences of floods.

All risk management partners need to find better ways to support recovery after a flood. Local flood risk management strategies should place a high priority on supporting communities and individuals in the event of floods. One way is to encourage the formation of local flood action groups. Partner organisations can then work with these groups in planning the response to flooding. Such groups may be well placed to provide volunteer community flood wardens and promote faster recovery from flooding.

Mechanisms for preparing for floods and other civil emergencies are set out in the Civil Contingencies Act (2004)⁽²⁴⁾. This provides arrangements for planning and responding

to emergencies, using local resilience forums (LRFs) that facilitate the preparation of emergency plans and co-operation between organisations that have emergency planning duties under the Act.

Up front planning helps to ensure that the response to flood incidents is well rehearsed, that partner roles and responsibilities are clear and that incident management resources are effectively deployed. When a flood happens, the emergency services, local authorities, Environment Agency, water companies and others work together to maximise the effectiveness of their collective emergency response. This includes working with other LRFs to ensure provision of mutual aid and co-ordinated incident response within a catchment. The risk management authorities should also reduce flood risks where needed during an incident, for example by removing debris accumulations at in-channel structures or by temporarily raising the crests of structures to prevent over-topping.

The role of local radio and television, and increasingly internet services and social media is vital in keeping people informed during flood incidents. Defra, the Environment Agency and local government will work together to help develop a single information portal to share consistent high-level information with the public on flooding before, during and after floods.

A national multi-agency register of flood rescue assets and the operational arrangements that will govern their use is being finalised and will be co-ordinated by the Fire and Rescue Services National Coordination Centre. The Government has also committed to assessing whether there is a need to introduce a statutory duty on Fire and Rescue Services and other organisations to undertake work on flooding following the completion of the Flood Rescue National Enhancement Project.

Post-flood recovery is led by local authorities. Government has published the principles for when it will, in exceptional circumstances, consider providing additional financial support to assist affected local authorities with the costs of recovery. The issues likely to be faced in post-flood recovery should be considered in advance of an incident to understand the priorities within a community and opportunities for more sustainable reconstruction. The Government has issued guidance on disaster recovery. The role of community support groups such as the National Flood Forum is of great value in the recovery phase. The Cumbria floods in November 2009 highlighted that recovery from floods is more effective if prior engagement on flood risk and the development of local arrangements have been undertaken.

Defra will co-ordinate a group to review how users of caravan and camp sites can be better prepared to cope with flood risk. These sites are often vulnerable and risk to life is potentially more significant than in other areas that may be at risk.

Vehicles and their occupants may also be at high risk during floods and drivers can place themselves and their passengers in danger by underestimating the hazards presented, or hidden, by flood waters. People must also take great care to avoid placing themselves and others at risk when wading through flood waters and when working to protect or repair property during and after a flood incident.

4 Working together to protect people and property

This section sets out the functions of the flood and coastal erosion risk management authorities and how they should work together, co-operating to manage risks effectively. These are set out at three levels: addressing policy and the strategic overview of FCERM, planning risk management, and implementing risk management measures.

In carrying out these roles, the primary functions of the lead organisations have been identified. However, these will usually need to be carried out working in partnership with others to obtain the required results. These functions include those of the risk management authorities as set out in the Act. The Act offers flexibility and options for joint arrangements, which means that these roles may be varied to suit local circumstance and community needs. Any changes of this type will be set out in the local flood risk strategy for the area in question to ensure that lead roles are clear. In practice, it is essential that the organisations involved at each level in FCERM work together, co-ordinating their activities and pooling resources. The aim should be to bring together the required expertise, powers and resources to respond to local community needs, while ensuring co-ordinated management of risks within catchments and coastal cells as required by section 13 of the Flood and Water Management Act.

4.1 Policy and the strategic overview of FCERM

The development of flood and coastal erosion risk management policy is led by Defra on behalf of the Government. Policy is prepared within the context of wider Government policy areas led by other departments, for example, covering the use of public funds (Treasury), emergency response (Cabinet Office) and land-use planning (Department for Communities and Local Government). The Environment Agency and other organisations support this by providing evidence and advice.

The Environment Agency has a strategic overview of the management of all sources of flooding and coastal erosion distinct from the operational function it has in relation to managing flood risk from main rivers and the sea. This strategy seeks to provide a clear national framework for flood and coastal erosion risk management, with all sources of flooding and coastal erosion identified and managed using a risk-based approach, allowing local responsibility and decision-making where appropriate. It also aims to ensure that the roles and responsibilities of those managing risk are defined and understood; that all involved, including communities at risk, know what they need to do; and that progress is monitored and understood.

Activities carried out as part of the strategic overview include the following:

- **setting the direction for FCERM through strategic plans.** This includes working with others to maintain and implement CFMPs and SMPs. The Environment Agency also provides guidance to lead local flood authorities on, and collates and reviews, their assessments, maps and plans for local flood risk management under the Flood Risk Regulations.
- **providing the evidence and advice to inform Government policy and to support others.** This includes national flood and coastal erosion risk information, data and tools to help risk management authorities exercise their FCERM functions, and advice on planning and development issues.

- **supporting collaboration, knowledge-building and sharing of good practice.** This includes delivering programmes to support the development of FCERM skills and capacity, and working collaboratively with nationally representative bodies to provide an effective framework to empower local delivery.
- **establishing and supporting Regional Flood and Coastal Committees (RFCCs) and allocating funding.** This includes allocations to risk management works within the national priority programme. The RFCCs will consult on and consent the Environment Agency's regional FCERM investment programmes as well as providing a forum for raising and allocating local funding and identifying and sharing good practice.
- **monitoring and reporting on flood and coastal erosion risk management.** This includes reporting on implementation of the national FCERM strategy.

4.2 Planning risk management

The lead roles in planning flood and coastal erosion risk management actions are as follows:

- Environment Agency – flooding from main rivers, estuaries and the sea and reservoirs;
- lead local flood authorities – flooding from surface water, groundwater and ordinary watercourses;
- coastal erosion risk management authorities including the Environment Agency – coastal erosion.

As set out in Section 3.3.1 and in Annex 2, there are a number of risk assessments and plans already in place that will need to be maintained and developed in the future. In practice, this work must be done in partnership with the lead organisations working with other risk management authorities and delivery organisations and communities. The aim is to ensure that plans meet local needs within a catchment and coastal cell context and do not have an adverse impact on others. This approach should also seek to ensure that potential synergies, joint working with other authorities, and opportunities to achieve wider benefits are identified and secured.

The Flood and Water Management Act makes provision for lead local flood authorities. These are the unitary authority for the area in question or, if there is no unitary authority, the county council. In addition, in some areas there will also be district, town and parish councils that cover smaller areas but still have an essential function in managing risks. Under the Act the lead local flood authorities have duties to:

- develop, maintain and apply a strategy for local flood risk management in their areas;
- maintain a register of assets;
- establish SuDS approval bodies.

Coastal erosion risk management authorities are identified by the Act as those districts or unitary councils that have a coastal erosion risk management function. Alongside its role in managing coastal flooding, the Environment Agency is also a coastal erosion risk management authority. The functions of these authorities include those identified in

the Act as well as the Coast Protection Act (1949)⁽²⁵⁾. Local authorities play a fundamental role in managing and protecting the coastline by leading on coastal erosion management activities, leading and supporting coastal groups and producing shoreline management plans through the relevant coastal group. Effective partnership working between the Environment Agency and coastal local authorities is critical to successful integrated coastal zone management.

District councils will have a key role to play in partnership with lead local flood authorities in planning risk management and in making decisions on development in their area as a local planning authority. In developing land-use plans, planning authorities must take flood risk and coastal erosion into account and ensure that the risks are managed and new properties are insurable over their lifetime. This includes ensuring that there is adequate access and egress to and from buildings in the event of a flood.

Utility and infrastructure providers, for example water and sewerage companies, energy companies and the Highways Agency, already maintain plans for the future development and maintenance of the services they provide. In doing this, it is essential that they input to FCERM plans, for example by providing information and advice, and take account of FCERM plans in their own planning process. This will ensure that their assets and systems are resilient to flood and coastal risks and that the required level of service can be maintained in the event of an incident. Utility and infrastructure providers may wish to invest time and resources into developing and delivering the local flood risk management strategy, to realise the significant benefits for them and their customers that follow from flood risks being effectively managed.

Although they are not a risk management authority, regional flood and coastal committees (RFCCs) are being established to take forward much of the work previously carried out by regional flood defence committees (RFDCs), with an extended remit to include coastal erosion. They will play an important local role in guiding flood and coastal management activities within catchments and along the coast, advising on and approving programmes of work for their areas and continuing to raise local levies under existing arrangements to fund local priority projects and works. RFCC's also provide for local democratic input through the majority membership of representatives from lead local flood authorities. It is intended that they will also have a wider role in assisting the scrutiny of local authority risk assessments, maps and plans required by the Flood Risk Regulations. They will have a key role in balancing local priorities and making sure that investment is co-ordinated at the catchment and shoreline scale and in promoting the consideration of climate change impacts in local decision making.

Local resilience forums include risk management authorities and ensure that the public services and infrastructure operators plan to work effectively together during flood incidents.

4.3 Implementing risk management measures

Avoiding inappropriate development in areas at risk of flooding and coastal change

District councils and unitary authorities have key roles in land use planning and working with communities to ensure that development is appropriate for the area in question. This is supported by the Environment Agency as a statutory consultee for flooding and other organisations such as infrastructure and utility providers who provide advice. The

Environment Agency also has a regulatory role in consenting works carried out by others in, or adjacent to, water courses and sea/tidal defences to ensure that they have regard to flood risk and do not cause unnecessary environmental damage. Local authorities will be taking over the issue of consents for the alteration, removal or replacement of designated structures or features related to ordinary watercourses on commencement of the relevant parts of the Flood and Water Management Act.

Reducing the risk of flooding from rivers, the sea and reservoirs

The Environment Agency leads the risk-based management of flooding from main rivers and the sea. Its functions include bringing forward flood defence schemes, and it will work with lead local flood authorities and local communities to shape schemes which respond to local priorities. It may arrange for its functions to be carried out on its behalf by other organisations as set out in the Act. It also acts as the enforcement authority for reservoirs with a storage capacity greater than 25,000m³ and, once the relevant parts of the Act have been commenced, reservoirs with a capacity of 10,000 m³. Responsibility for carrying out work to manage reservoir safety lies with the reservoir owner/operator.

Reducing the risk of flooding from surface water, groundwater and ordinary watercourses

This work is led by lead local flood authorities and district councils, as set out under the Act and also Part 3 of the Land Drainage Act 1991⁽²⁶⁾. Where appropriate, they may arrange for this work to be carried out on their behalf by other organisations, for example by internal drainage boards (IDBs).

IDBs are independent public bodies responsible for water level management in low-lying areas, currently covering approximately 10 per cent of England. Their membership includes representatives of the occupiers of the land within their district and local authority nominees to represent other interests. IDBs are the land drainage authority within their districts and their functions include the supervision of land drainage, funded by land owners, and flood defence works on ordinary watercourses or other flood sources as requested by local authorities or the Environment Agency. In doing this, they closely manage water levels, both in watercourses and underground (groundwater), by improving and maintaining ordinary watercourses, drainage channels and pumping stations to reduce the risk of flooding.

IDBs have an important role to play in flood risk management and in habitat creation and management. They are able to involve local people, as well as raise funds from beneficiaries and stimulate volunteer activity.

Reducing the risk of flooding from sewers and drains

Water and sewerage companies are responsible for managing the risks of flooding from water and foul or combined sewer systems. This may need to be carried out in partnership with others, for example, working with developers and landowners to reduce the input of rainfall into sewers through storage, source control and SuDS.

Highways authorities have lead responsibility for providing and managing highway drainage and roadside ditches under the Highways Act 1980⁽²⁷⁾. The owners of land adjoining a highway also have a common law duty to maintain ditches to prevent them causing a nuisance to road users.

To manage these risks, it is essential that proper links are made with the Environment Agency, lead local flood authorities and district councils to ensure that this is well co-ordinated with other flood management activities.

Reducing the risk of coastal erosion

This work is led by coastal erosion risk management authorities, in particular, coastal local authorities and the Environment Agency who work closely together to ensure that coastal flood and erosion risks are managed in a co-ordinated way. Coastal local authorities undertake works to tackle the risk of sea flooding and coastal erosion where they are best placed to do so. Coastal authorities also have powers to protect land against coastal erosion and to control third party activities on the coast. This includes the construction of private defences or the removal of beach material.

Flood incident management and recovery after a flood

District councils will have a key role to play in partnership with lead local flood authorities in managing flooding in their area. As a category one responder under the Civil Contingencies Act, all local government authorities have an important role to play in emergency planning and especially in flood recovery. This is supported by the Environment Agency and the Met Office by providing forecasts and warnings of flooding from rivers and the sea in England (and where catchments cross over the border with Wales), and working with the Scottish Environmental Protection Agency where catchments cross over the Scottish border. The Environment Agency and other asset operating authorities also have a role in proactive operational management of their assets and systems to reduce risk during a flood incident.

The Civil Contingencies Act requires Category 1 responders to have plans in place to respond to emergencies and reduce, control or mitigate the effects of an emergency. Multi-agency flood plans are developed by local resilience forums (LRFs) to help the organisations involved in responding to a flood to work better together and the National Flood Emergency Framework for England includes guidance on developing and assessing these plans. The Environment Agency contributes to the development of these plans and helps in managing flood incidents. Lead local flood authorities also have a duty under the Act to investigate flood incidents to help understand how they happened, their impacts, and actions that may be taken to reduce future risk.

Defra is the lead government department for co-ordinating national support to the response phase of flood incidents. The Department of Communities and Local Government is the lead government department for the recovery phase after an incident. Specific guidance on recovery from emergencies can be accessed via the Cabinet Office's UK Resilience web resources.

4.4 Other organisations involved in flood and coastal risk management

There are many other bodies that play an important role in FCERM. Natural England and English Heritage are the Government's advisors on the natural environment and cultural heritage. The Met Office, British Waterways, transport and utilities providers all have important expertise and/or infrastructure that may impact on FCERM. Local partnerships, forums and community groups also provide valuable local knowledge and insight as well as a focus for involving local people. There are many non-government

organisations that contribute to managing flood and coastal erosion risks, including the Association of British Insurers, Royal Society for the Protection of Birds, Association of Drainage Authorities, engineering consultants and contractors, National Flood Forum, National Voice for Coastal Communities, Royal National Lifeboat Institution, Red Cross, Salvation Army, the armed forces, professional institutions, universities, Country Land and Business Association and National Farmers Union, River Restoration Centre, as well as land owners and land managers. There are also a number of organisations that own and maintain FCERM structures and structures that may have other primary functions but which also help to reduce flood risk or coastal erosion. These include ports authorities, the Highways Agency and Network Rail, alongside other third party asset owners.

In areas where river catchments cross over the borders with Wales and Scotland, it will also be essential to co-ordinate risk management activities with the Welsh and Scottish risk management authorities, including the Welsh Assembly Government, Environment Agency Wales, Scottish Environmental Protection Agency, Scottish Water and the appropriate Welsh and Scottish local authorities.

4.5 Skills and capabilities

In managing flood risk and coastal erosion it is essential that access to the required skills, capabilities and knowledge is maintained. This includes the maintenance of professional codes and standards, especially where engineered assets and systems are in place and their failure could result in loss of life or significant damage to property. The relevant professional institutions such as the Institution of Civil Engineers and the Chartered Institution of Water and Environmental Management have an important role in this work by upholding professional standards.

The Environment Agency is working with Defra and local authorities to build the level of knowledge and skills that will help flood risk authorities to carry out their roles and responsibilities as the Flood and Water Management Act is implemented. The Capacity Building Strategy includes three main areas:

- supporting existing staff;
- developing new staff, and;
- developing new tools and information.

The strategy and prioritisation of issues is based on evidence from a series of studies and consultations over the past 3 years and an in-depth profiling of lead local flood authorities carried out in November 2010.

The Environment Agency has developed a programme of workshops and on-line learning covering six topics (Understanding the new Legislation, Preliminary Flood Risk Assessments, Collaborative Working, Sharing Information, Local Strategies and Sustainable Drainage). The Environment Agency will continue to develop learning tools and forums to support staff in their implementation of the strategy. Alongside this support the further education courses that have been developed by the Environment Agency to recruit and train new staff in FCERM have been extended to the lead local flood authorities. Since September 2009 forty five trainees have taken up posts within lead local flood authorities and enrolled on the work-based Foundation Degree. The support through sharing learning and training will be carried forward and extended in the future.

5 Funding for flood and coastal erosion risk management

The benefits of FCERM typically outweigh costs many times over, providing significant gains to land and property owners and others by avoiding future damage to property, safeguarding insurance terms, and preventing the serious trauma and health impacts that flooding and coastal erosion cause. In addition to continued national funding, local areas and partners will be encouraged to invest more in flood and coastal erosion risk management. Doing so will mean more communities can enjoy the benefits of protection, whilst giving each area at risk a bigger say in the action taken. Decisions can be taken locally, and voluntarily, on whether and how to contribute towards schemes. Government support will prioritise help for those most at risk and least able to afford to protect themselves.

This section provides the framework within which choices can be made about national and local priorities for expenditure, and how national resources will be targeted.

5.1 Approach to targeting Government resources

Flooding and coastal erosion cannot be entirely prevented and the relevant legislation is largely permissive. This means that there is no general right to be protected from flooding and coastal erosion, and no right to be protected to any particular standard where risk management action is taken. Instead, Government promotes nationally consistent approaches to assessing and managing flood and coastal erosion risk. Government, through national taxation, is also the primary funder of risk management activity, with the majority of funds within the system provided by Defra to the Environment Agency as Flood Defence Grant-in-Aid. This block grant together with centralised delivery allows economies of scale to be exploited and means that uneven investment profiles in each part of the country can be managed.

The benefits and costs of managing risks across the country are appraised using guidelines based on the HM Treasury *Green Book*⁽²⁸⁾. Government funding and resources are prioritised to achieve the greatest reduction in risk possible, either as a result of direct investment or by facilitating wider sources of funding. Assets and systems are managed to maximise their whole-life value, ensuring an appropriate balance between providing improved levels of protection and maintaining existing systems.

As a result, it is estimated that approximately 85 per cent of the potential annual damages from flooding are prevented by the flood risk management assets and systems already in place. However, future annual damages are expected to rise due to climate change, and the natural deterioration in the condition of existing assets. They will also increase if inappropriate new development were to take place. Therefore, overall investment, by the private and public sectors combined, needs to keep pace with pressures over the medium to long-term to avoid flood risk and rates of coastal erosion increasing over time.

5.2 Capital investment in new and improved assets and systems

In recent years capital investment by Government has been allocated to achieve a range of social, economic and environmental outcome measure targets. Investments that have made the biggest contribution towards the targets, per pound of investment required, have been prioritised.

While this approach has been successful in delivering outcomes against Government priorities, overall levels of activity have been constrained by the amount of national funding available. This means that some areas have benefited from good levels of protection for ‘free’, at the general taxpayers’ expense, but similar levels of protection cannot be afforded for everyone. In recent years the system has also been criticised for being too top-down, lacking in local influence. The predominance of Government funding in the system can also lead communities to assume that their defence project will be funded eventually. In some cases, this is unrealistic and undermines incentives for local action in the meantime.

Objectives of the national capital allocation system

From April 2012 there will be a transition towards a new system of allocating national capital funding to risk management projects. Defra will make separate announcements to confirm the arrangements that will apply. The arrangements aim to achieve the objectives below, and will be designed in accordance with the general principles that follow.

The reforms aim to **better protect more communities, deliver more benefits, and help avoid deprivation caused by flooding and coastal erosion**, by:

- ***encouraging total investment to increase beyond levels affordable to central Government alone.*** Additional investment will help offset the twin long-term challenges of climate change and asset deterioration, whilst moving funding arrangements onto a more sustainable footing. Investment in reducing the risk of flooding is also the best way of keeping insurance cover affordable. The Pitt Review said that long-term investment plans “*should not simply assume that the costs of flood risk management will be met centrally*”.
- ***enabling more local choice, and encouraging innovative, cost-effective options to come forward in which civil society may play a greater role.*** Those that live or have an interest in the areas at risk should have a bigger say in what gets done, in return for greater local and private contributions towards the benefits delivered. The Pitt Review said Government should develop a scheme that “allows and encourages local communities to invest in flood risk management measures”.
- ***increasing levels of certainty and transparency*** over the national funding for individual projects whilst prioritising action for those most at risk and least able to protect or insure themselves. Introducing more certainty over Government funding for each community will encourage additional investment to come forward, or alternative actions to be taken, if local priorities are unlikely to be entirely met by national budgets alone.

Principles underpinning the national capital allocation system

The guiding principles for the national capital allocation system are as follows.

No.	Principle	Rationale and implications
1	Rather than some projects being fully paid for and others not at all at least some national funding will be on offer to all potential projects over time based on the outcomes and benefits each would deliver	To give every potential project the opportunity of at least some funding support from central Government. Projects that deliver sufficient benefits may be 100% funded by central Government. Projects that deliver relatively less will be offered an amount of funding based on the benefits they achieve, as long as other funding or cost savings can be found to bridge the gap.
2	Funds from central Government should prioritise protecting those most at risk and least able to help themselves	National funding will always be limited and therefore needs to focus on areas where it can have the greatest impact, including in terms of alleviating the knock-on consequences of flooding or coastal erosion such as financial deprivation.
3	All flood and coastal erosion risk management projects should be treated equally based on the benefits being delivered and damages avoided, regardless of the type of risk or the risk management authority involved	So that all sources of flood risk, and coastal erosion, are valued fairly and given common access to funding from central Government. Funding levels will be based on a project's relative benefits, allowing trade-offs to be made between tackling different sources of risk, and between community-level and property-level approaches. This does not change the funding arrangements for work to address sewer flooding and drainage works that water companies are responsible for.
4	The general taxpayer should not pay to protect new development in areas at risk of flooding or coastal change, now or in the future	New properties completed, or existing buildings converted into housing, after 1 January 2012 will not have an influence on the allocation of national funding to projects. As a result, local responsibilities are reinforced for decisions taken over the nature and location of development. The Pitt Review said developers should <i>"make a full contribution towards the costs both of building and maintaining any necessary defences"</i> .
5	Greater local input and decision making should not come at the expense of creating a stable, long-term pipeline of projects necessary to exploit potential economies of scale and efficiencies in delivery	Long-term investment planning, and creating sufficient certainty of work several years in advance allows risk management authorities and their contractors to deliver projects more cheaply and efficiently. There is a risk that increased local discretion, with some decisions potentially taken or reviewed annually, may lead to a stop-start project pipeline. Therefore, once decisions have been taken at the appropriate local or regional level there should be limited ability to change them.
6	All investment should be made within a nationally-consistent framework , to take account of policies and findings within CFMPs and SMPs, with options adequately appraised in line with HM Treasury guidance.	So that approaches being taken are technically sound and sustainable, do not have unforeseen adverse consequences on other areas, and work with natural processes where possible.

5.3 Maintenance of existing defence asset systems

The maintenance of asset systems is carried out using a risk-based approach so that investment is made where activities contribute most towards reducing the potential for damage, and where it is economically and environmentally justified. Future investment in maintenance will continue to be prioritised to ensure that the greatest possible overall outcome is achieved with the available funding.

Flood risk and coastal erosion management assets such as embankments, culverts and pumps work with others as part of a system, together providing protection to a defined 'benefit area'. Failure of any one single asset could put the whole system at risk. The Environment Agency, therefore, uses a system-wide approach to manage the main river and tidal flooding assets and has, in recent years, been investing in developing System Asset Management Plans (SAMPs) for every one of the 2,700 flood risk management systems in England. This has involved mapping each asset system, cataloguing all assets performing an FCERM function, and appraising the future costs to maintain and replace Environment Agency assets and the benefits of maintaining the system as a whole.

This information can help to identify where resources could be allocated more efficiently to deliver maintenance outcomes, taking current circumstances and priorities into account. For example it might highlight systems for which investment has previously been available to fund maintenance work, but where the economic benefit of this work is lower than in other systems where maintenance has not been funded. Therefore, a potential consequence of better prioritisation and the need to ensure value for money is that maintenance activity in some systems may need to be reduced or even cease.

Since a range of factors are relevant when the required level of maintenance for an asset is reviewed, four categories are considered:

- assets for which there is an economic case for maintenance to reduce the risk from flooding to people and property;
- assets that are required to protect internationally designated environmental features from the damaging effect of flooding;
- assets that do not fit categories one and two above, but where work is justified due to legal commitments;
- assets that do not fit the above three categories.

The Environment Agency will aim to maintain the assets it is responsible for in the first two categories. It will also aim to maintain assets in the third category, at least for the immediate future. The longer-term future of these assets will be determined through detailed local studies.

While current investment levels may be sufficient to achieve this maintenance programme in the short term, the effects of asset deterioration and climate change could make this more challenging as time progresses.

For assets in the last category, the Environment Agency will consult with interested parties and, as soon as is reasonably and practically possible, cease maintenance to be able to fulfil higher priorities elsewhere. In cases where the Environment Agency cannot continue to justify or afford continuing maintenance activity, potential options include:

- the Environment Agency reducing levels of activity to the point where the costs are justifiable and affordable from a flood risk management perspective.
- the Environment Agency continuing as at present but seeking contributions from those benefiting from the activity, for example if the activity has additional benefits such as draining land for agricultural production.
- the Environment Agency handing over responsibility for the asset system to another party by agreement, such as a local authority or IDB, a local landowners' co-operative, or other community group. This would require that the watercourse is 'de-mained' (meaning that it is no longer designated as a main river, allowing others to manage it instead). For instance, an existing internal drainage board may apply to extend its boundaries to cover a de-mained watercourse, or an application may be made to create a new IDB in the area.
- ceasing the activity, and allowing the area to return to its natural state. In some cases this will deliver improved biodiversity and other environmental outcomes.

The appropriate option for a specific situation would be chosen in consultation with landowners, local bodies and local communities.

Information from SAMPs will be routinely available to lead local flood authorities and other local partners to consider as they prepare local flood risk management strategies.

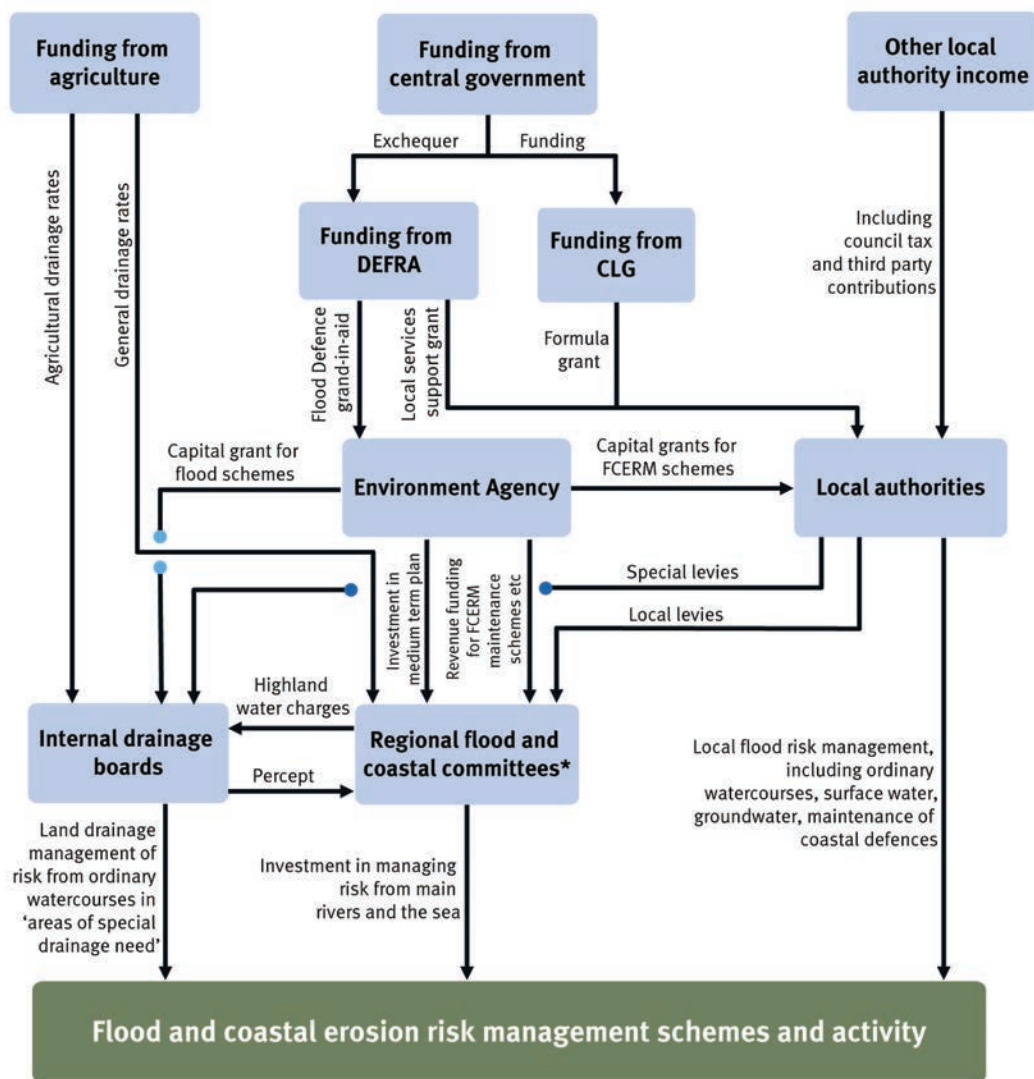
A protocol is in place between the Environment Agency and the Country Land and Business Association, National Farmers Union and Natural England to help manage situations where the maintenance of sea defences ceases. A similar protocol is under development by the Environment Agency in conjunction with the Country Land and Business Association, National Farmers Union and Natural England for inland flood risk management assets.

This will not affect the arrangements for national funding for maintenance works by local authorities and internal drainage boards, which is made available within formula grant from the Department for Communities and Local Government.

5.4 Costs and benefits of FCERM measures

In the 2011-2012 financial year, Defra is due to spend £521 million on FCERM through the Environment Agency in England. In addition to this, local authorities are funded by the Department of Communities and Local Government through Formula Grant and by Defra to undertake new roles under the Flood and Water Management Act. Investment in FCERM protects people, property and the environment. By preventing flooding and coastal erosion, physical assets deliver very high economic benefits. In the 2008-2009 to 2010-2011 investment programme every £1 of capital investment in flood and coastal erosion risk management provided an average long-term benefit in reduced damage of approximately £8.

Figure Eight illustrates the flow of funding through the system to deliver flood and coastal erosion risk management activity. Figures for each flow can be found on the Defra website.



* Note the Environment Agency delivers flood risk management schemes and maintenance as approved by RFCCs

Figure Eight: Funding streams of risk management authorities

6 Reporting on the strategy and supporting information

6.1 Reporting on and reviewing the national strategy

Following commencement of Section 18 of the Flood and Water Management Act the Environment Agency will be required to report to the Minister about flood and coastal erosion risk management. In particular, these reports must include information about the application of the national flood and coastal erosion risk management strategy for England. This must include information on all sources of flood risk and coastal erosion produced by all of the accountable FCERM authorities. An outline of the main reporting responsibilities is set out in Annex 2. The reports should be fit-for-purpose, meeting legal requirements, without placing an excessive burden on any of the authorities.

Where reporting covers local authority progress, it will be carried out at the level of the lead local flood authority unit rather than for all levels of local authorities, and reflect the local partnership arrangements in place for each area.

High level national FCERM reporting will be carried out annually and build on existing practices. More detailed reports will be provided to coincide with the six-year cycle of the Flood Risk Regulations, with further interim reports being produced as directed by Government to support policy decisions such as future Government spending reviews. Reviews of the national strategy will be timed to coincide with one of these six yearly reports.

Reporting needs to be informed by accurate data which should include the number of properties protected from flooding by publicly funded schemes. There is no single mechanism at present to record the numbers of properties flooded across the country. It is important to capture this information for all forms of flooding. From April 2011 lead local flood authorities will have a duty under the Flood and Water Management Act to investigate flood events. The Environment Agency will work with local government representatives to produce advice on how this duty can be fulfilled.

6.2 Advice or guidance to help manage risks

A suite of guidance and advice will be developed to help those involved in implementing this strategy. In some instances, for example where it is essential that a nationally consistent approach is adopted, this will take the form of statutory guidance (this means that there is a legal requirement for risk management authorities to follow the guidance). However, wherever possible it will be provided as non-statutory advice to allow more flexible approaches. A list of the guidance and advice available can be found on the Environment Agency website.

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Annex 1 Catchment flood management plan and shoreline management plan boundaries

Catchment flood management plan boundaries

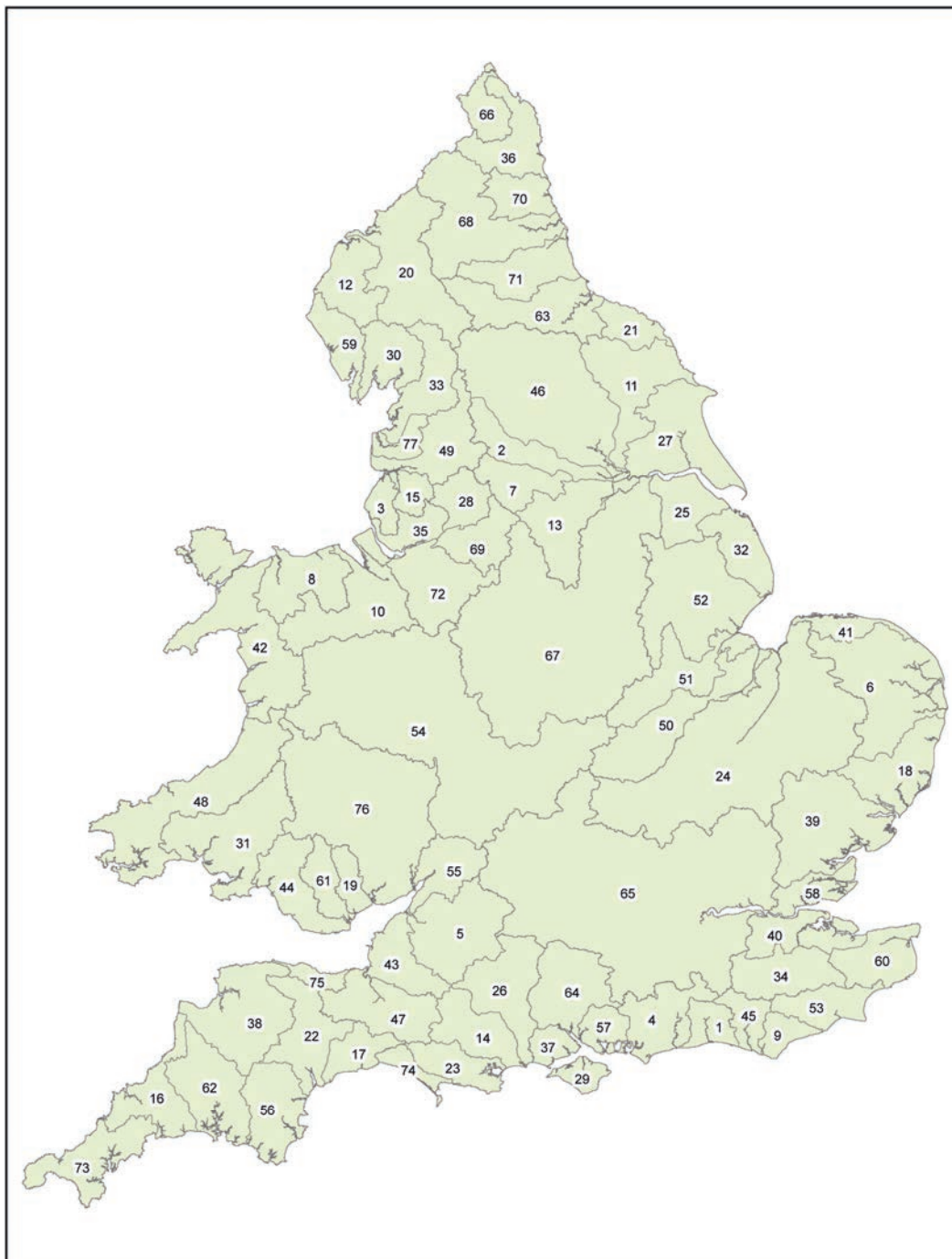


Figure Nine: Catchment flood management plan boundaries

The names of the catchments identified in Figure Nine are given in the table below:

ID	CFMP Name	ID	CFMP Name
1	Adur	40	North Kent Rivers
2	Aire	41	North Norfolk
3	Alt Crossens	42	North West Wales
4	Arun and Western Streams	43	North and Mid Somerset
5	Bristol Avon	44	Ogmore, Tawe (including Thaw and Cadoxton)
6	Broadland	45	Ouse (Kent)
7	Calder	46	Ouse (Yorkshire)
8	Conwy and Clwyd	47	Parrett
9	Cuckmere and Sussex Havens	48	Pembrokeshire and Ceredigion Rivers
10	Dee	49	Ribble
11	Derwent (Yorkshire)	50	River Nene
12	Derwent (Cumbria)	51	River Welland
13	Don	52	River Witham
14	Dorset Stour	53	Rother and Romney
15	Douglas	54	Severn
16	East Cornwall	55	Severn Tidal Tributaries
17	East Devon	56	South Devon
18	East Suffolk	57	South East Hampshire
19	Eastern Valleys	58	South Essex
20	Eden	59	South West Lakes
21	Esk	60	Stour
22	Exe	61	Taff and Ely
23	Frome and Piddle	62	Tamar
24	Great Ouse	63	Tees
25	Grimsby & Ancholme	64	Test and Itchen
26	Hampshire Avon	65	Thames
27	Hull	66	Till
28	Irwell	67	Trent
29	Isle of Wight	68	Tyne
30	Kent and Leven	69	Upper Mersey
31	Loughor to Taf	70	Wansbeck
32	Louth Coastal	71	Wear
33	Lune	72	Weaver Gowy
34	Medway	73	West Cornwall
35	Mersey Estuary	74	West Dorset
36	North East Northumberland	75	West Somerset
37	New Forest	76	Wye and Usk
38	North Devon	77	Wyre
39	North Essex		

Shoreline management plan boundaries



Figure Ten: Shoreline management plan boundaries

Annex 2 FCERM - legal background, key supporting documents and reporting

Legal background

The national and international legal framework behind the approaches used in managing flood and coastal erosion risks includes:

- The Flood and Water Management Act (2010) (FWMA) - provides new legislation on FCERM, including the development of this national strategy and local strategies.
- Flood Risk Regulations (2009) - transpose the EU Floods Directive into UK law. The Regulations set out a six-year cycle of activities to understand and manage risk in line with the Floods Directive.
- The Climate Change Act (2008) - requires a UK-wide climate change risk assessment every five years accompanied by a national adaptation programme that is also reviewed every five years. The Act has given the Government new powers to require public bodies and statutory organisations such as water companies to report on how they are adapting to climate change.
- The Conservation of Habitats & Species Regulations (2010) transpose the Habitats Directive into UK law. The regulations aim to help maintain and enhance biodiversity throughout the EU, by conserving natural habitats, flora and fauna. The main way it does this is by establishing a coherent network of protected areas and strict protection measures for particularly rare and threatened species.
- The Water Framework Directive (2000/60/EC) and Floods Directive (2007/60/EC) - require consolidated river basin management planning, assessment and mapping of hazards and risks, and preparation and use of flood risk management plans. The frameworks set out in the directives closely match those already applied in the UK.
- Civil Contingencies Act 2004 (CCA) – Legislation that aims to provide a single framework for civil protection in the United Kingdom and sets out the actions that need to be taken in the event of a flood. The CCA is separated into two substantive parts: local arrangements for civil protection (Part 1) and emergency powers (Part 2).

Supporting documents

The strategy will also have links to a number of other key documents covering the background to flood and coastal risk management, the planning context within which flood and coastal risks are managed and more detailed information setting out the Environment Agency's understanding of risks and possible actions that may be taken to manage them. These include:

The Pitt Review (2008) – identified the lessons learned following the 2007 floods, focusing on the needs of people living and working in areas at risk. The review made 92 recommendations, focusing on six key aspects of flood risk management (see *Figure Eleven*) and has also led to a greater focus on surface water flooding - a main cause of damage in the 2007 floods. In particular, it highlighted the need to:

- improve the quality of flood warnings through closer co-operation between the Met Office and the Environment Agency, and improved modelling of all forms of flooding;
- provide the Environment Agency with a wider brief, taking on the national overview for all forms of flooding, ask councils to strengthen their technical ability to take the lead on local flood risk management, and that more should be done to protect communities through robust building and planning controls;
- improve incident management by ensuring that emergency services and other organisations work consistently well together through better preparation and planning;
- improve planning and protection for critical infrastructure to avoid the loss of essential services such as water and power. Private sector companies must also be more closely involved in planning to keep people safe in the event of a dam or reservoir failure;
- be more open about risk;
- provide better advice so that people can protect their families and homes more effectively and that they are more aware of flooding;
- maintain people's health and speed up the recovery process after a flood, giving people the earliest possible chance to get their lives back to normal.



Figure Eleven: Pitt Review recommendations - key focus areas

Catchment flood management plans (CFMPs) - these are high-level planning tools that set out objectives for flood risk management across each river catchment and estuary. They have been produced by the Environment Agency for the 68 main catchments in England and are designed to set the overall direction of flood risk management in a catchment. They also identify broad flood risk management policies that are economically practical, have a potential life of 50 to 100 years, and will help the Environment Agency work with others to put them in place. However, they do not have a source of funding associated with them. The CFMPs consider all sources of inland flood risk but do not cover flooding from the sea but do cover flooding associated with inter-tidal areas of estuaries. However, at present the Environment Agency's understanding of river and tidal flooding is better than that from other sources.

Shoreline management plans (SMP) - coastal risk management is prioritised through SMPs. SMPs and the associated action plans set the direction for how coastal flood and erosion risk is managed and list work that will explore and define exactly what and how this can be done. They form route maps, setting out the sustainable management policies for the coast for the next 20, 50 and 100 years. They do not have a source of money associated with them. The existing SMPs are currently being reviewed, with second generation SMPs in England due for completion in 2011. There are 20 SMPs that cover the English coastline and the majority of them are owned by coastal local authorities that are responsible for managing coastal erosion risks. They are produced by coastal groups as a collaborative approach between local authorities and the Environment Agency, which assists with the production and approval of these plans and has responsibility for coastal flood risk management. The SMPs set the strategic direction for all flood and coastal risk management. More detailed studies identify how these policies can be implemented through constructing, realigning or managing defence works.

System asset management plan (SAMP) – these are long-term plans covering a collection of assets that protect a discrete area known as a system. It includes information on costs for maintaining and replacing assets over their life. The plan also gives an indication of the benefits within the system and can be used to generate outline benefit cost analysis. SAMPs are a valuable source of information for asset management and flood risk management.

Preliminary flood risk assessment (PFRA) – PFRAs are being undertaken by lead local flood authorities for the first stage of the Flood Risk Regulations 2009. The preliminary assessment reports assemble information on past flooding and potential future flooding and its consequences to inform the identification of flood risk areas, where maps and management plans will be required. PFRAs must be submitted to the Environment Agency for review by June 2011 and will be published by December 2011.

Surface water management plan (SWMP) - County council and unitary authorities are leading and co-ordinating the production of SWMPs for key locations that consider flood risk from surface water, groundwater and ordinary watercourses. SWMPs will provide a greater understanding of local flood risk in England and result in co-ordinated action plans agreed by all partners and supported by an understanding of the costs and benefits, which partners will use to work together to identify measures to reduce surface water flooding. They will establish long-term action plans to manage local flood risk and should influence future capital investment, drainage management, public involvement and understanding, land-use planning, emergency planning and future development. There are approximately 70 SWMPs currently being undertaken by local authorities including priority areas identified by Defra in August 2009. Defra provided specific grants for priority SWMPs, plus funding for early surface water management actions, during the 2007 Comprehensive Spending Review period.

River basin management plans (RBMP) - the central tool for setting out the objectives and actions required in working together to achieve the objectives of the Water Framework Directive. The plans state the environmental objectives for the river basin district and explain the measures necessary to achieve good ecological status or potential where this is technically or environmentally feasible.

Reporting

The table below outlines the key reporting topics and authorities/organisations that may need to support this by providing information. Authorities will have to work together to minimise the burden of reporting and ensure that there is no duplication in arrangements.

Table Two: FCERM reporting responsibilities

	Environment Agency	Lead local flood authority	Internal drainage board
Assessment of the scale and magnitude of flood and coastal erosion risk to people, property, infrastructure and the environment and how these risks are changing (for example, due to climate change)	X	X	
Lead local flood authority progress in developing and implementing local strategies		X	
Progress in implementing the Flood Risk Regulations	X	X	
Value for money of Flood Defence Grant in Aid capital programme and additional contributions	X	X	X
Financial performance and progress of schemes flood risk initiatives funded by Defra grants	X	X	X
Flood risk and flood damage avoided as a result of operating authority intervention	X	X	X
Amount of inappropriate development permitted in the flood plain and coastal change management areas	X	X	
Working with natural processes, improving and maintaining environmental and cultural heritage and the wider environment, including contributions to Water Framework Directive targets	X	X	X
Providing flood warning services and community scale flood response procedures	X	X	
Details of major flood events, response to them and lessons learned	X	X	
Risks and issues relating to implementing agreed outcome measures or their replacements	X		
Major developments / achievements in FCRM R&D	X		
Skills and capacity levels of risk management authorities	X	X	X

Note: Responsibilities for reporting are indicated with an X. To achieve the above, it is important that information is exchanged between the risk management authorities, for example between local planning authorities as part of district authorities or lead local flood authorities and the Environment Agency as part of the development control process to ensure that the Environment Agency is aware of the outcome of any planning decisions in areas at risk.

Glossary

ABI	Association of British Insurers
Act	A Bill approved by both the House of Commons and the House of Lords and formally agreed to by the reigning monarch (known as Royal Assent)
ADA	Association of Drainage Authorities
Assets	Structures, or a system of structures used to manage flood risk.
Building Regulations	The UK Building Regulations are rules of a statutory nature to set standards for the design and construction of buildings, primarily to ensure the safety and health for people in or around those buildings, but also for purposes of energy conservation and access to and about other buildings
Catchments	An area that serves a river with rainwater, that is every part of land where the rainfall drains to a single watercourse is in the same catchment.
CFMP	Catchment Flood Management Plan
CLA	Country Land and Business Association
Climate change	The change in average conditions of the atmosphere near the Earth's surface over a long period of time.
Coastal cell	A length of coast within which the movement of natural sediments is largely contained
Coastal erosion	The wearing away of the coastline, usually by wind and/or wave action.
Coastal flooding	Occurs when coastal defences are unable to contain the normal predicted high tides that can cause flooding, usually when a high tide combines with a storm surge (created by high winds or very low atmospheric pressure).
Cultural heritage	Buildings, structures and landscape features that have an historic value.
Culvert	A covered structure under a road, embankment etc, to direct the flow of water.
DCLG	Department for Communities and Local Government
Defences	A structure that is used to reduce the probability of floodwater or coastal erosion affecting a particular area (for example a raised embankment or sea wall)
Defra	Department for Environment, Food and Rural Affairs
Deposition	The process whereby sediment is placed on the sea bed, shoreline, river bed or floodplain.
Drainage authorities	Organisations involved in water level management, including IDBs, the Environment Agency, and RFDCs.
FCERM	Flood and coastal erosion risk management
Flood	The temporary covering by water of land not normally covered with water
Groundwater flooding	Occurs when water levels in the ground rise above the natural surface. Low-lying areas underlain by permeable strata are particularly susceptible.
IDB	Internal drainage board
Important infrastructure	Infrastructure that supplies essential services, for

	example, water, energy, communications, transport.
LGA	Local Government Association
LLFA	Lead local flood authority
Main River	A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers
NFU	National Farmers Union
Ordinary watercourses	All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, IDBs.
Recovery	The process of rebuilding, restoring and rehabilitating the community following an emergency.
Reservoir	A natural or artificial lake where water is collected and stored until needed. Reservoirs can be used for irrigation, recreation, providing water supply for municipal needs, hydroelectric power or controlling water flow.
Resilience	The ability of the community, services, area or infrastructure to avoid being flooded or lost to erosion, or to withstand the consequences of flooding or erosion taking place.
RFDC	Regional flood defence committee
RFCC	Regional flood and coastal committee
Risk	Measures the significance of a potential event in terms of likelihood and impact. In the context of the Civil Contingencies Act 2004, the events in question are emergencies
Risk assessment	A structured and auditable process of identifying potentially significant events, assessing their likelihood and impacts, and then combining these to provide an overall assessment of risk, as a basis for further decisions and action.
Risk management authorities	Organisations that have a key role in flood and coastal erosion risk management as defined by the Flood and Water Management Act (2010). These are the Environment Agency, lead local flood authorities, district councils where there is no unitary authority, internal drainage boards, water companies, and highways authorities.
River flooding	Occurs when water levels in a channel overwhelms the capacity of the channel.
RSPB	Royal Society for the Protection of Birds
SEA	Strategic environmental assessment
SMP	Shoreline Management Plan
Standard of protection	The flood event return period above which significant damage and possible failure of the flood defences could occur.
SuDS	Sustainable drainage systems
Surface water flooding	Flooding from rainwater (including snow and other precipitation) which has not entered a watercourse, drainage system or public sewer.
SWMP	Surface Water Management Plan
Voluntary groups	Self-governing organisations, some being registered charities, some incorporated non-profit organisations. They deliver work for the public benefit using volunteers.
Watercourse	A channel (natural or artificial) along which water flows

Environment Agency

03708 506 506 or

0800 807 060 (24 hour incident hotline number)

Floodline 0845 988 1188

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